JPRS-EST-86-022

11 SEPTEMBER 1986

Europe Report

SCIENCE AND TECHNOLOGY

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EUROPE REPORT

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WEST EUROPE

EAST EUROPE

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BRIEFS

DASSAULT SUBSIDIARY IN FRG--Dassault Systemes, subsidiary of Avions Dassault specialized in CAD, and Ikoss, one of the most important German companies in data processing services, have just announced the creation of a common subsidiary in Stuttgart (FRG) called Catia Software Service GmbH. This company will provide German clients training and technical support for Catia, the CAD CAM software designed by Dassault Systemes. Ikoss has 250 employees and had a turnover of Fr 120 million in 1985. Dassault Systemes (230 employees) had a profit of Fr 16 million in 1985 (turnover of Fr 110 million). Catia, launched in 1981, is installed in more than 500 companies. [Text] [Paris ZERO UN INFORMATIQUE in French 16 Jun 86 p 8] 25031/12859

CSO: 3698/A184

ITALIAN MONTEDISON BUYS SWEDISH FERMENTA

Stockholm DAGENS NYHETER in Swedish 8 Jul 86 p 8

[Article by Dan Magnerot]

[Text] Refaat El-Sayed is saying thank you and farewell. Yesterday he announced that he is selling his company, Fermenta. The purchaser will be the Italian chemical giant Montedison, which is paying just over 3 billion kronor for El-Sayed's Fermenta stock.

"You can see the sale as a form of punishment for Swedish business and the Swedish establishment," an extremely disappointed Refaat El-Sayed said.

It is a resigned El-Sayed who has now decided to sell his Fermenta company. The dream of a worldwide company in the field of biotechnology never became a reality. All the events surrounding Fermenta last spring were too much.

These included the Volvo-Fermenta deal that fell through, the false doctorate, fines payed to the Stockholm Stock Exchange, and the threat of prosecution for insider trading. Now, most recently, there is the purchase of Leo by Pharmacia, a purchase that, to a great extent, is based on Refaat El-Sayed's ideas of last winter concerning a new structure for the Swedish biotechnology and pharmaceutical industry.

"Everything that happened last spring actually resulted from the Volvo deal that fell through," El-Sayed said.

"I know that I am in the right. If I had chosen, I could have carried through with the Volvo deal, but I did not want to do so in the courts," he said.

Deeply Disappointed

El-Sayed said he was deeply disappointed over how the Volvo deal was handled. He mentioned the names of several people of whom he had a very low opinion.

They include stock exchange president Bengt Ryden, who he believes damaged Fermenta's reputation abroad by his indirect demand that El-Sayed reduce his holdings in the company, under the threat of having Fermenta removed from the stock market.

Then there is Olle Alsen, editorial writer for DAGENS NYHETER, who called Fermenta stock a "10-kronor stock." There is Ulf Elvestedt of the stock exchange, Sten Wikander, head of the Fourth AP Fund, and last but not least, as El-Sayed said, the "Volvo chief's underlings."

"All this has made it impossible for me to continue in Swedish industry. No one in the world could survive the pressure I have been under. This is why I must quit," El-Sayed said.

He was also extremely bitter over the news last week that the pharmaceutical and biotechnology firm Pharmacia had purchased the pharmaceutical company Leo.

"That was my idea and they have stolen it, but they cannot steal my head," El-Sayed said.

Another strong reason why Refaat El-Sayed is now selling his life's work is the debt he incurred in connection with the unsuccessful Volvo-Fermenta deal. At that time, he bought up about 4 million Fermenta shares, which Volvo was to have obtained in exchange for stock in Pharmacia and Sonesson. That put him deep into debt.

"My debts now total 1.4 billion kronor. If these debts were not so great, I may have waited a bit longer," El-Sayed said.

Revenge

Now, however, he is selling his Fermenta shares. There are 6 million A-shares and about 11 million B-shares. He is receiving 160 kronor for restricted shares and 180 kronor for free B-shares. The price of the A-shares has not yet been set. Nevertheless, the deal will total just over 3 billion kronor. Thus, El-Sayed will retain about 2 billion kronor before taxes. He sees the sale of his company to the Italian chemical giant Montedison as an act of revenge, as well.

"The fact that an international company is prepared to pay 160 to 180 kronor for shares in Fermenta indicates that the company is not an empty air bubble. The Swedish industry has never understood what Fermenta actually is. Now the establishment will be punished. Now an international concern will take over," said El-Sayed. El-Sayed will also leave the Fermenta board, but he said he will continue to work for the company.

"I will work for Fermenta on a consultant basis if the Montedison board so chooses. I am not through. I will return. After all, I still have my money," he said.

Thus, the new owner of Fermenta will be the Italian chemical firm Montedison. It is Italy's second largest company. Only Fiat is larger. Montedison is a global company with activities around the world. It is involved in many areas: industrial chemicals, pharmaceuticals, plaster, petrochemical products, synthetic fibers, special chemicals, energy, fertilizers, pesticides, glass, and more.

Other Shares

The company has had problems throughout the 1980's, but it turned losses of 4 billion kronor in 1983 into a profit of 500 million kronor in 1985. The price of the company's stock doubled this year alone. Last year the firm grossed almost 60 billion kronor. It employs about 70,000 people.

"Both industrially and geographically, Fermenta's structure is perfectly suited to Montedison," said Giorgio Porta, executive vice president of Montedison, with responsibility for industrial and marketing questions.

Porta also said, without real conviction, that the company eventually could place a bid for the remaining stock in Fermenta. He would not say how Fermenta would be operated in the future, however.

"The board will have to discuss that," he said. Certain matters remain before the deal will be complete, however. The basic agreement between El-Sayed and Montedison must be approved by the boards of both Fermenta and Montedison. In addition, the labor organizations, the Swedish government, and other authorities will have their say. If all goes according to plan, the deal should be completed by late September.

9336
CSO: 3698/574

BRIEFS

ATR-42 IN BEIJING--Beijing--The new twin-engined passenger aircraft ATR-42, built jointly by Aeritalia and the French company, Aerospatiale, recently arrived in Beijing for a series of demonstration flights in China. Mr Renato Bonifacio, the president of Aeritalia, also arrived in Beijing for the occasion. On behalf of the Italian-French consortium, Mr Bonifacio is coordinating the negotiations with Chinese authorities concerning the sale of the aircraft to the Chinese airline, CAAC. Mr Bonifacio, an engineer, said that negotiations are going well because the ATR-42 superbly meets China's need to develop a rapid and efficient system of domestic transport as soon as possible. The ATR-42 already has a portfolio of 121 outstanding orders and options. [Text] [Rome IL POPOLO in Italian 19 Jul 86 p 12] 8606/9312

CSO: 3698/M215

IIRIAM'S ROLE IN FRENCH AI RESEARCH

Paris ZERO UN INFORMATIQUE in French 21 Apr 86 p 76

[Article by Pierre Lombard: "The Marseilles IIRIAM: An Original Research Structure"]

[Text] After 2 years of existence, the Marseilles International Institute for Robotics and Artificial Intelligence (IIRIAM) is continuing its research, education and technological watch activities. Its original structure gives it unique freedom of action.

The Marseilles IIRIAM has been nearly 2 years in existence. Officially created in July 1984 and now headed by Jean-Francois Le Maitre, this body is an original research structure which operates more like an American than like our French institutions.

Indeed, the IIRIAM lies midway between the public and the private domains, since it was created as a mixed corporation with a capital of Fr 10 million. Those who contributed to its foundation were: the City of Marseilles, the general council of the Bouches-du-Rhone department, the regional council of the Provence-Cote d'Azur region, and the Marseilles chamber of commerce and industry. Industrial groups also invested in the IIRIAM: Renault, Thomson, Matra, Comex, Barras Provence, Bertin, etc; and so did financial institutions: SDRD, Marseilles Credit Company and Paribas.

Most of the stock of this entity is owned by the state. The IIRIAM has an annual budget of about Fr 20 million, one third of which comes from subsidies. It now has a staff of about 30.

The Essential for the IIRIAM Is not to Have Knowledge, but to Distribute it

But the originality of the IIRIAM does not lie solely in its legal structure. However, that structure gives it its unique freedom of action. Indeed, because it was created by local communities desirous to possess a technology transfer organism, the institute does not capitalize knowledge within itself, but redistributes it to companies with which it collaborates; as a result, the IIRIAM staff is not destined to grow.

As early as 1984, an agreement was signed between IIRIAM and Prologia, the company designed to promote university research on Prolog. In 1985, the IIRIAM helped export the Prolog II language to the United States.

The institute has also entrusted Prologia with part of the development of the Serafin expert system. In the same field, the IIRIAM will announce the creation of the Artificial Intelligence Application Company (SAIA) at the next Avignon symposium. This company will be active in the following fields: on the one hand, development of expert systems for services and for the administration and, on the other hand, development of natural language interfaces on databases.

Many Expert System Realizations Together With Professionals

In CAD, the IIRIAM will provide its support to the Orkis and Cintec companies. The former is working on the prototype of an electronic camera that could be piloted by a Macintosh. The latter specializes in consulting and assistance for CAD/CAM services.

Finally, the Marseilles institute owns 10 percent of the stock of Cybernetics which will be geared to robotics and automation.

In addition to these industrial activities, the IIRIAM, of course, fulfills its role as a training organization and as a research and computing research center. The so-called long curriculum of the Marseilles institute is highly specialized and designed either for engineers who are already practicing, or for young students who have received a general education in an engineering school.

With over 1,0000 course hours (see box [not reproduced]), the IIRIAM intends to give its trainees (in restricted numbers) an in-depth panorama of advanced technologies: artificial intelligence, robotics and computer-integrated manufacturing.

Teaching is dispensed by specialists in each domain and is designed primarily to meet the needs of regional businesses. The latter also often finance tuition, which amounts to Fr 100,000. Regional grants are available for individual candidates. In that case, tuition fees are reduced to Fr 14,000.

In addition to this long curriculum, the Marseilles institute organizes information seminars on the new technologies. Thus, specialized seminars will train engineers and researchers in the following subjects: advanced programming languages, artificial intelligence, relational databases, diagnostic aid systems and robotics.

In addition, international symposiums gather scientific personalities in Marseilles. Among others, we should mention the fall 1984 symposium on artificial intelligence (see 01 INFORMATIQUE No 826) and ORIA 85, dedicated to the applications of artificial intelligence and robotics (see 01 INFORMATIQUE No 867). Finally, punctual seminars may be organized at the request of companies.

As far as pilot projects are concerned, the IIRIAM prefers practical applications. These projects are always carried out with the professionals of specific economic sectors: building and public works, agriculture, the sea, applied artificial intelligence and robotics.

In architecture, the Keops project should lead to the production of an expert system to solve the problem of laying out elementary partitions. Layout is usually achieved with a catalog of components. The idea in this case is to entrust this task to a computer.

The Soffito project aims at making a mockup for an all-purpose secondary-work robot. A first stage would involve painting and ceiling-making.

The objective of the Set project is to produce an expert system to help thermal diagnostic in housing. Thermal diagnostic consists in a precise study and description of the condition of a building, and a list of proposals to improve the heating system. The latter must take into account climate conditions, the resources of the inhabitants and their mode of occupancy.

The Tecton project consists in making software capable of dialoguing with the architect during the initial stages of architectural design. The architect's knowledge concerning the semantics of objects and their relations will be accessible through a computer.

The IIRIAM Is Also Acting as an Observer of Regional Economic Activity

As for the Sysex & Clyd project, its goal is to explore the potential applications of artificial intelligence techniques to the Euclid software package and, in particular, the use of expert systems to assist designers.

In the field of agriculture, the Magali project is expected to lead to the development of a robotized fruit-picking machine. Picking would then be done by an automotive machine equipped with a driving assistance system and picking arms.

In shipbuilding, the Marseilles institute is working on an expert system adapted to the construction of metallic hulls. Called Sesicen, this system would complement the Sicen CAD software already used in that industry. As for the UFS project, it consists in developing a flexible welding unit for the shipbuilding industry. The goal is to achieve maximum automation of welding tasks inside ship recesses.

Finally, the Sud-Marine project will provide a mockup for an expert system to assist in repairing naval Diesel engines. The system will describe the elementary operations to be carried out and the special tools required, based on the type of the engine, its specific environment, its history, and the experience of the repairman.

The IIRIAM is also taking part in an alarm management program. It is called Alliance and might be used to provide security at the Cadarache facilities of the Atomic Energy Commission.

In the commercial field, the Serafin project is designed to produce an expert information system concerning state financial aids to businesses. As for the Biblio project, it is geared to the general public and designed to promote access to culture and knowledge, using data processing and communication networks.

In research, the Mirage and Robolog projects are studying respectively the construction of object-oriented expert systems written in Prolog, and the definition of a high-level language to describe the motions and programming of a robot.

We cannot conclude without mentioning that, in addition to its training and research activities, the IIRIAM is acting as an observer of regional economic activity. Indeed, the Marseilles institute will carry out surveys on the use of new technologies in businesses of the Provence-Cote d'Azur region. In this respect, the IIRIAM is a "technology watch" organization for key sectors of the regional economy.

9294
CSO: 3698/A620

AEROSPATIALE OF FRANCE IN ESPRIT AI PROJECT

Paris AFP SCIENCES in French 19 Jun 86 p 27

[Text] Paris--Aerospatiale has renewed the interest in artificial intelligence by developing new industrial applications for expert systems (ES). Expert systems will enable very large projects to be designed within the shortest possible time periods and with a higher level of quality than with conventional programs, which are indispensable for manned launchers.

In the military area, a diagnostic ES was created to improve the identification of damage on AS 30 laser missile launchers, a task difficult to master using conventional programming. The new programming is performed using a language very close to natural language and is based on 80 rules describing the proper operation of the missile launcher, cases of breakdowns and errors in handling. When compared to the results obtained with conventional bench testing, the rate of non-identification was cut to 1/3 and the number of identifications was multiplied by 3.

In the helicopter production process, the ES will enable computer processing for integrating monitoring operations in the operational modes of manufacturing. The ES is able to determine whether there is no solution to a problem, which excludes the quality risk and allows the expert to intervene only in special cases and potentially to develop the base of knowledge. A project for complete automation (CAD/CAM) from the design through the manufacturing phases is under development in conjunction with the University of Marseille. The prototype will be completed next September.

In the civilian arena, a research effort is underway for integrating "intelligent" software into the on-board systems of commercial airliners, specifically for maintenance for future Airbus jets. The technical documentation for an airplane (120,000 pages per aircraft, 1,000,000 pages for the entire fleet) is under consultation at the European level to study the impact of artificial intelligence on:

-- the incorporation of modifications and the creation of new variations of the product;

-- making the documentation available in interactive form.

By the beginning of 1987, this consultation process should result in submission of a project to be conducted in the framework of the Esprit project. In the area of space, Aerospatiale is working with the National Institute of Research and Computer and Automated Systems (INRIA) in Sophia-Antipolis on the SMECI (multi-expert engineering design system) software which provides for automated design of technological objects as complex as satellites.

The first model of an expert system for the design of a telecommunications satellite has just been completed. It offers 5 to 10 satellite solutions (based on the customer's order) after examining approximately 600 possibilities. This is the equivalent of the work of three engineers for one week. The space industry, which uses rapidly evolving state of the art technologies, is often faced with the paradox of a product life expectancy which is greater than or comparable to the time in which these technologies become obsolete.

12798/12947
CSO: 3698/610

BRIEFS

EUROPEAN PARALLEL PROGRAMMING CENTER--The development of software tools that provide for optimum use of machine parallels is of utmost importance. In France, various research projects are underway on this subject: for example, in Toulouse, at ENSEEIHT (Toulouse National College of Electrotechnology, Electronics, Information Processing and Hydraulics) (parallel programming of algorithms) and at Onera Chatillon, on the parallel research machine, where four AP 120 FPS vector processors are connected. One interesting idea of note initiated by a group of researchers in Toulouse is the creation of a European research and study center in Toulouse to work on these problems: development of languages and methods for parallel programming, writing of parallel algorithms and codes on certain types of applications. The first types of applications planned are problems of hyper- and supersonic flows and turbulence problems. Another objective is training researchers in parallel programming. The project is currently supported by a number of organizations and industries and seems to be well underway. Germany has expressed a keen interest and the other countries (Denmark, Spain, Great Britain, the Netherlands, Sweden) have indicated that they will probably participate if the Cerfacs is launched by France and Germany. Preliminary budget for Cerfacs: some 200 million francs per year. Projected staff: 180 employees. To be continued. [Text] [Paris INDUSTRIES & TECHNIQUES in French 20 Jun 86 p 91] 12798/12947

BULL CAPITAL CHANGE--The Bull Machine Company has just performed various capital operations to clear its liabilities estimated at Fr 2 billion. The government has contributed Fr 1 billion in capital without modifying the initial distribution of shares between the government (93 percent) and private shareholders (7 percent). The new capital amounts to Fr 3.8 billion, compared to Fr 2.7 billion previously, and is divided into 160 million shares of Fr 24 each. Note that the Bull Machine Company is the group's holding company. [Text] [Paris ZERO UN INFORMATIQUE in French 16 Jun 86 p 6] 25031/12859

FRG AI RESEARCH--The West German government has set aside DM121 million for research on artificial intelligence. In addition to basic research, the program will focus on the development of prototypes. The joint effort of university graduates and industrialists should enable Germany to develop so-called fifth-generation computers. In particular, expert systems will be created and priority will be given to pattern recognition, voice processing, and graphic analysis. Siemens is involved in 8 out of the 11 projects scheduled. [Text] [Amsterdam COMPUTERWORLD in Dutch 6 May 86 p 2] 25021/12781

FRENCH ROBOTICS INDUSTRY OVERVIEW

Paris L'USINE NOUVELLE in French 29 May 86 pp 58-64

[Article by Antoine Schoen: "French Robotics: Effort Rewarded At Last"

[Excerpts] Condemned for some time to a deficit expansion, French robotics seems to have caught a second wind. In 1986, the great majority of PME's (small and medium-sized enterprises) in the field will have found the path to profits, if not to balanced accounts. This healthier situation will allow the sector first of all to better resist the penetration of foreign manufacturers in France, and then to counterattack on foreign markets.

The smile of Jean-Pierre Poncet, director general of Albora, testifies to the fact that a French PMI (small and medium-sized industry) of 17 employees can carve a place for itself on the robotics market. Crowded in a Grenoble building which has become too small after a fast expansion, Albora does not dream of hiding its success: its robots have found their way in the shops of the most demanding manufacturers. But what is most important is that after closing the books on 1985 with balanced accounts, Mr Poncet foresees profits for this year.

It is reassuring to know that Albora is profitable, especially since this performance is not an isolated one. Several other French PMI's which are showing their equipment at the Productique 86 Salon (28 May to 4 June in Paris, Porte de Versailles) also expect to get out of the red this year.

Like their American and European colleagues, the French robotics manufacturers seemed for several years to be condemned to a deficit expansion. French deliveries were growing steadily (37 percent in 1984 and 51 percent in 1985), but the bottom lines remained disastrous. This inability of robotics to be profitable presented a particular risk in France since it dangled the threat of disappearance over a major link of French robotics, the PMI's.

This high-tech sector consists of one biggie and a large number of smaller PMI's. Strutting at the head of the class is Acma, supported by a powerful group which is none other than Renault. Last year, this subsidiary of the

automobile manufacturer had revenues of 227 million francs; with 400 robots sold in 1985, it has cut for itself a large slice of France's deliveries. About 50 industrialists which seek to become robotics manufacturers, share the rest of the market.

32 Percent of Robots are Imported

It is certain that none of these challengers can overtake Acma's leadership; by the same token, the Renault subsidiary, specialized in heavy robotics (spot and arc welding), cannot capture all the French market. This does not relieve the PMI's from having to defend every inch of their ground, lest they see their share of the market fall into the pockets of foreign manufacturers.

The steady drop in the penetration of imported equipment proves that the French robot manufacturers are in a position to resist the foreign industry. Out of 1920 robots counted at the end of 1983, 36 percent were imported; this figure dropped to 34 percent in 1984, out of 2720 installed robots, and to 32 percent in 1985, out of 4150 machines.

This progress in the French position, coupled with a sustained development of the inventory, is nevertheless viewed with caution by Bernard Elineau, sales and marketing director of Sepro, at La Roche-sur-Yon, in Vendee. "The major problem of French robotics is not a question of volume: it is a matter of profitability," he says.

To achieve profitability, many of the robot producers depend on specialization, limiting themselves to several industrial tasks (wood cutting, press loading, and so on) which they handle perfectly.

The AKR company, specializing in spraying (paint, sand, and so on), leads the band of supporters of dedicated robotics. Established in 1979, this joint subsidiary of the AOIP instrumentation company and the painting equipment manufacturer Kremlin, has a strong international reputation. It has four subsidiaries in the United States, Germany, Italy, and Great-Britain, obtaining two-thirds of its revenue from exportation; the American market alone absorbs nearly one-half of its production.

This performance is not due to luck: it rests on a fierce drive to become international. "Exportation is our only chance for survival," explains Roger David, director of marketing and industrial developments.

Directed by Maurice Lande, father of the AKR robot, the company has indeed positioned itself in a narrow slot, since the world market of painting robots does not exceed 500 units per year, with AKR carving out a healthy slice. Last year, the Evry company sold nearly 80 units, bringing its count to more than 200 machines; the only French company to play a significant role on the world robotics stage, AKR nevertheless remains in a delicate situation.

Still losing money in 1984, AKR, which had revenues of 65 million francs in 1985 and expects 85 million this year, just barely balanced its accounts last year. From now on, it cannot afford to make any mistakes, because its major

stockholder, AOIP (Kremlin, leading French manufacturer of painting equipment, controls only a fraction of the capital), is faced with serious financial problems. In any case, it cannot absorb new losses from its robotics subsidiary, nor support its development.

Forced to self-finance a growth which amounts to 30 percent this year, will AKR withstand its Norwegian competitor Trallfa, which last year was taken over by the Swedish Asea? Or will it have to turn to a partner capable of financing its growth? Mr David does not dismiss this possibility, but with some reservations: "The ideal would be a 'sleeping partner' [as published]. But the offers we are presently receiving threaten the company's management independence."

AKR's mistrust of a new financial partner is widespread among the profession; it is shared by the majority of robot manufacturers. Started by highly motivated teams, these enterprises are now looking for a second wind to finance their growth.

A Purely Financial Operation

"Risk capital is too timid in France. It has not kept pace with the company founders' efforts. And the industrial groups which could lend us a hand do not offer sufficient guarantees. They appear primarily interested in absorbing us at a ridiculously low price," bemoans Francois Danel, CEO of the Grenoble company AID. Faced by this financial headache for several years, this pioneer of French robotics has chosen an original solution. On one hand, he approached the Rossignol group: the ski giant will ask AID to robotize its production lines, and in exchange it will let the company use its expertise of composite fibers, an upcoming material for robots. On the other hand, to minimize its financial costs, AID has refocused on robotics and the mechanization of production lines, farming out its other high voltage and instrumentation activities to subsidiaries.

A purely financial operation: the profits from these subsidiaries, Irelec (created in association with Seiv, of the Societe Havraise des Petroles) and Alpes Instruments, which will have total revenues of 20 million francs this year (compared to 8 million last year), should allow Mr Danel to balance the books of the parent company. AID, which did 35 million francs of business in 1985 (40 percent of it in exportation), counts on a volume of more than 40 million in 1986.

This scheme clearly illustrates Mr Danel's strategy: the development of new projects must be financed from products whose research costs have been amortized.

Concerned about scattering its know-how, AID has specialized in the robotization of several tasks (meat, wood, cloth, and other cutting) by following a strict rule: "We carry out all our developments in collaboration with a manufacturer interested in that application," explains Mr Danel. Thus, in order to produce a class 10 robot for the electronic industry, Mr Danel has opted to collaborate with Semy Engineering, specialized in the fabrication of diffusion furnaces.

This collaboration is essential for the robot manufacturer. Its knowledge of the industrial process in question is a powerful commercial advantage. "Our work is not limited to selling a machine," points out Mr Poncet. "We sell a robot as well as organization advice."

Formerly with Allibert, which until last year held 30 percent of Albora's capital, Mr Poncet is not a newcomer in the plastics processing industry. He chose Albora's product, a robot for unloading injection presses, on the strength of his familiarity with the sector; a judicious choice, given the 50 units delivered in 1985, which doubled its installed inventory.

The growth in revenue testifies to Albora's success: from 4.5 million francs in 1984, it went to 11 million in 1985 and to 16 million this year.

Aim at Broader Targets

Established under Allibert's benevolent eye in crowded quarters, Albora rapidly wanted to gain its independence. Using a recent increase in capital, it left the financial orbit of the plastics processor, and has sought to diversify its customers. Today, Allibert absorbs only 20 percent of Albora's production, and this percentage should drop even further.

On the strength of his national success, Mr Poncet now aims at exportation. He recently signed a commercial agreement with a young high-tech startup in Leicester, ATM Automation, which will allow him to aim at the British market.

This alliance is an important step for Albora because it broadens its target. Mr Poncet did not join a competitor, but rather a partner whose products complement Albora's line: ATM's manipulators will allow the Grenoble company to increase its power. It is now in a position to automate other tasks than the unloading of injection presses.

Mr Poncet is thus faced with a delicate alternative. Will he remain specialized in his original slot, or will he prefer to capitalize his company's experience to aim at a broader target such as materials handling? A justifiable temptation, since the size of this market would allow Albora to accelerate its development.

One Albora competitor recently faced with the same problem, opted to take the plunge. It left the specialty of injection parts unloading to enter the mechanical industry field. At the Productique 86 Salon, Sepro is showing a robot for unloading machine-tools. Solidly anchored in the plastics processing industry, Sepro is broadening its ambitions to materials handling. "We must rapidly become one of the five leading European manufacturers, not only in the unloading of injection presses, but also in palletization," confides Mr Elineau.

For injection, the objective is reasonable: with 450 installed robots (20 percent of them from abroad), the La Roche-sur-Yon company claims 60 percent of the units installed in the French plastics processing industry.

In the palletization slot that Sepro has just entered, everything still remains to be done. But the welcome mat is out and Mr Elineau is confident. Supported by motivated private investors (he showed them balanced books for 1985), he views the future with optimism.

His company's position justifies this confidence. With 60 employees, revenues of 40 million francs in 1985, and an annual growth of 35 percent, Sepro is a serious player in the French robotics game, even if the industry ends up growing. "The robotics market has to become healthier before we can derive real profits," explains Mr Elineau.

This is an opinion unanimously voiced by the profession. Despite a clear improvement among robot manufacturers, the competition is still strong. Any contract gives rise to severe fighting among them, resulting in a serious price war. "We have several times been forced to drop business in order not to sell at a loss. But the miracle has not happened. Our competitors, which had ultimately won the contracts, had to close up shop in subsequent months," says Eric Laurent, CEO of Elitec, a manufacturer of modular robots in Meylan, near Grenoble.

Good Start For Midi Robots

The French have gotten used to robots in their plants; they will soon be ready to meet them outside their work. On the basis of this simple postulate, Eric Daclin has created Midi Robots. Associated with AEC to develop robots designed to clean the Metro, this Toulouse company has chosen an original strategy: it selected non-manufacturing robotics, the robotics of service.

Benefiting from the development of sensors and control electronics, autonomous robots are still taking their first steps. But their future is promising, and France is in a good position on this market. With Japan it has attained leadership in the RAM (multiservice autonomous robots) program launched by the Technology, Growth, Employment group formed at the Versailles Summit of June 1982.

Several French PMI's have achieved considerable technological progress in various fields of application. Calhene, subsidiary of AEC, AID, Bertin, Barras Provence, and the robotics and nuclear division of Hispano-Suiza have aimed at the nuclear market. Cerchar has undertaken an ambitious program to robotize coal cutting machines. Cemagref has entered agricultural roboti-zation. The Garches I2L company has selected industrial maintenance. And Midi Robots has already produced a prototype for cleaning the Metro. "Our strategy is to associate with cleaning specialists by specializing in the control of these machines," points out Mr Daclin. While waiting for an explosion in service robotics, Midi robots is basing its development on a less futuristic activity: it obtains one-third of its revenues (5 million francs in 1985, 7 million expected in 1986) by engineering flexible production cells.

Classification of Major French Robot Manufacturers: PMI's on ACMA's Tail

Company: ACMA
Revenue (in million francs): 227 Employees: 205
Capital distribution: Renault 100#percent
Objective: Spot and arc welding, materials handling
Agreements:

Company: ASEA Robotique
Revenue (in million francs): 130 Employees: 60
Capital distribution: Asea (Sweden) 100#percent
Objective: Welding, materials handling, assembly
Agreements: Integration agreements with Game Ingenierie, Syspro, CMG, Miidec

Company: AKR Robotique
Revenue (in million francs): 65 Employees: 100
Capital distribution: AOIP 99.97#percent, Kremlin 0.03#percent
Objective: Spraying (paint and so on)
Agreements: Commercial agreement with Kremlin, integration agreements with Sietam, Automatique Industrielle, Miidec, Danto-Rogeat

Company: SORMEL
Revenue (in million francs): 65 Employees: 140
Capital distribution: Matra 98#percent
Objective: Assembly
Agreements:

Company: SEPRO
Revenue (in million francs): 40 Employees: 60
Capital distribution: Groupe Atlantic 55#percent, private carriers 45#percent
Objective: Unloading of injection parts, palletization, lathe loading
Agreements:

Company: AID
Revenue (in million francs): 35 Employees: 46
Capital distribution: Francois Danel 48.7#percent, Finovelec 15.2#percent, Finovectron 10.7#percent, Epicea 10.7#percent, Jean-Pierre Auzimour 12.3#percent
Objective: Cutting, mobile robots, teaching robots
Agreements: Integration agreements with IBM and Hitachi, cooperation agreement with Itmi for teaching robots

Company: AFMA robots
Revenue (in million francs): 27 Employees: 60
Capital distribution: Telemecanique 90.98#percent, Leroy-Somer 9.02#percent
Objective: Materials handling, assembly
Agreements: Commercial agreements with DSR systems

Company: SCEMI
Revenue (in million francs): 25 Employees: 60
Capital distribution: Alsthom 100#percent
Objective: Electronic assembly, product packaging
Agreements: Integration agreements with Adept, Toshiba, and Itmi

Company: ITMI
Revenue (in million francs): 12 Employees: 50
Capital distribution: Hewlett-Packard 14.16#percent, Pechiney 14.16#percent, Banexi 8.2#percent, Natio Innovation 5.88#percent, private investors 51.79#percent
Objective: Advanced robotics using vision and artificial intelligence
Agreements: Integration agreements with Scemi, Commercy, Citroen, and AID

Company: ALBORA
Revenue (in million francs): 11 Employees: 17
Capital distribution: Ateliers Bouviers 19#percent, Pierre Contegiani 25#percent, Jean-Pierre Poncet 25#percent
Objective: Unloading of injection parts
Agreements: ATM Automation

Company: ELITEC
Revenue (in million francs): 8 Employees: 18
Capital distribution: Paturle 22#percent, Idef 42#percent, private investors 25.82#percent
Objective: Assembly
Agreements:

Company: ABC Productique
Revenue (in million francs): 6 Employees: 20
Capital distribution: Jean Mouton 100#percent
Objective: Manipulation
Agreements:

The gap between Acma and the major competing PMI's is quite apparent in this table prepared by L'USINE NOUVELLE, which does not cover all the French robotics market. Notably, the second position in this list belongs to an importer, the robotics division of Asea France, a subsidiary of the Swedish group. Asea Robotique, which last year was still assembling its robots at its Persan plant, now imports them fully assembled.

Source: L'USINE NOUVELLE

11,023
CSO: 3698/A617

BRIEFS

MANULI FIBER OPTICS PLANT--Battipaglia--Optical fibers and transmissions systems for data, voice, and images--the realm of advanced technology is now also part of southern Italy. If Battipaglia succeeds in justifying its description as a "small tecnopolis located in Campania," it will be due, in part, to the Manuli Cavi company, which manufactures optical fibers and transmission systems for data, voice, and images: The realm of advanced technology is now also present here and it seems destined to erase the image of idle factory chimneys thanks to its increasing expansion (qualitative and quantitative) which will enable Battipaglia to be referred to as an authentic technological center. And this will be stepped up even more when the new plant, which is being built right next to Manuli Cavi Spa in the industrial area, finally starts up. The new plant--MOC Spa (Manuli Optronic Cables)--represents the marriage of optics and electronics. Production is to start in October and the first sales have been scheduled for January 1987. Staff is now being hired, with initial employment of about 30 people, which will reach about 100 in the near future. The initial investment amounts to 12 billion lire, with the equity participation of Fime [Finanziaria Meridionale]. President Sandro Manuli of Manuli Cavi Spa explains: "Fime is our financial partner. Under the agreement signed last November, Fime has pledged to underwrite 40 percent of the company's capital. However, there is a repurchase clause for us on favorable terms." MOC Spa will operate in the sector of physical supports for high definition transmission of voice, data, and images. Therefore, this company operates in extremely new spheres of activity, which are opening up at an ever faster rate in the field of communications (a wide range of cables for electronics and data processing with great processing flexibility). [By Onorato Volzone] [Excerpt] [Naples IL MATTINO in Italian 17 Jul 86 p 9] 8606/9312

DIODE FOR LASER EXCITATION-- According to a report from Spectra-Physics GmbH, Darmstadt, a laser diode has for the first time been used to excite YAG lasers. In this manner, a degree of effectiveness can be obtained which is thirty times that resulting from excitation with flash lamps. The high-performance laser diode SDL-3210-J is said to reach a pulse energy of 2 milli-joules and a top output of 10 watts. Other material advantages, according to Spectra-Physics, consist of the smaller size of the laser diode and its service life, which is several times that of flash lamps. They further state that the construction of very compact Nd:YAG lasers for medical, military and communications technology purposes is now becoming a distinct possibility. [Frankfurt/Main FRANKFURTER ALLGEMEINE/BLICK DURCH DIE WIRTSCHAFT 30 Jun 86 p 7] 9273/12781

SWEDISH FIBEROPTIC SENSOR--Three new semiconductor probes for the Asea Thermometer fiberoptic measuring system are being marketed by the Swedish electronics firm Asea AB, of Vesteras. They are intended for measuring temperatures between zero and 200 degrees centigrade under difficult environmental conditions. The fibers are made of quartz and the glass-encapsulated sensors of aluminium-gallium arsenide. Asea envisions a large spectrum of applicability for these probes, ranging from the control of main bearings and coil heads in high voltage generators to temperature regulation in microwave ovens and electroplating baths. [Frankfurt/Main FRANKFURTER ALLGEMEINE/BLICK DURCH DIE WIRTSCHAFT in German 26 Jun 86 p 7] 9273/12781

CSO: 3698/556

IMEC, EUROPE'S LARGEST MULTINATIONAL INDEPENDENT R&D CENTER

Frankfurt/Main FRANKFURTER ALLGEMEINE/BLICK DURCH DIE WIRTSCHAFT in German 12 Jun 86 p 1

[Article by tar: "A European 'Silicon Valley' in Flanders--Europe's Largest Independent R&D Center Comes into Being Near Brussels"]

[Text] Frankfurt--Almost unnoticed by the public, Europe's largest independent R&D center is coming into being in Belgian Flanders: the Interuniversity Micro Electronics Center (IMEC), a complex in which the university's pure scientific research and applied industrial research are working side by side toward the same goals. The goal of IMEC is to promote training, research and microelectronics applications. According to a report in the 26 May issue of COMPUTER AGE, the center, to which the Belgian government has contributed $60 million, is to be officially opened in early June in Leuven near Brussels.

Other financial support comes from projects undertaken on behalf of industry. The president of IMEC, Professor R. van Overstraeten, is a well known scientist and director of the department of electronics at Leuven Catholic University. Its microelectronics center has in the past had success in helping small and medium-scale enterprises make microelectronic applications for industrial products and methods.

The strategic program of the Belgian government calls for emphasis on introducing microelectronics in production, in developing new products, and also in training and research. The IMEC laboratory will concentrate primarily on "microstructure science," i.e., it will work in the sub-micrometer area, so as to contribute to the development of the next generation of very large-scale integration circuit chips (VLSI), of opto-electronic components, sensors and switches. In addition, the design procedure for VLSI systems is to be improved there. The project will use the experience of the specialized laboratory and has already gathered a staff of 250 people, mostly well-trained engineers and technicians.

Part of the IMEC is INVOMEC, an intensive training program for VLSI design engineers. Present IMEC plans call for graduating 300 design engineers in 1987 who have successfully completed the ongoing study curriculum. IMEC spokesmen consider this particularly significant in view of the chronic shortage of VLSI specialists in Europe and America.

IMEC, which was originally funded exclusively by the Belgian government, is already cooperating with 35 foreign enterprises on research projects. Among U.S. firms with which research contracts have been signed are Eastman Kodak, Tektronix, General Electric and Analog Devices. Another contract is to be signed with Digital Equipment.

9273/12781
CSO: 3698/556

DANISH MICROELECTRONICS GROWTH EXPLOSIVE

Copenhagen BERLINGSKE TIDENDE in Danish 27 Jun 86 Sect III p 2

[Article by Jens Juul Nielsen: "Explosive Growth in Electronics Field"]

[Text] A new study shows that the electronics branch in Copenhagen can get a very strong increase in both sales and size of its workforce up to 1994. But a number of important preconditions must be fulfilled by the society.

A doubling of the workforce and a quadrupling of sales before 1994.

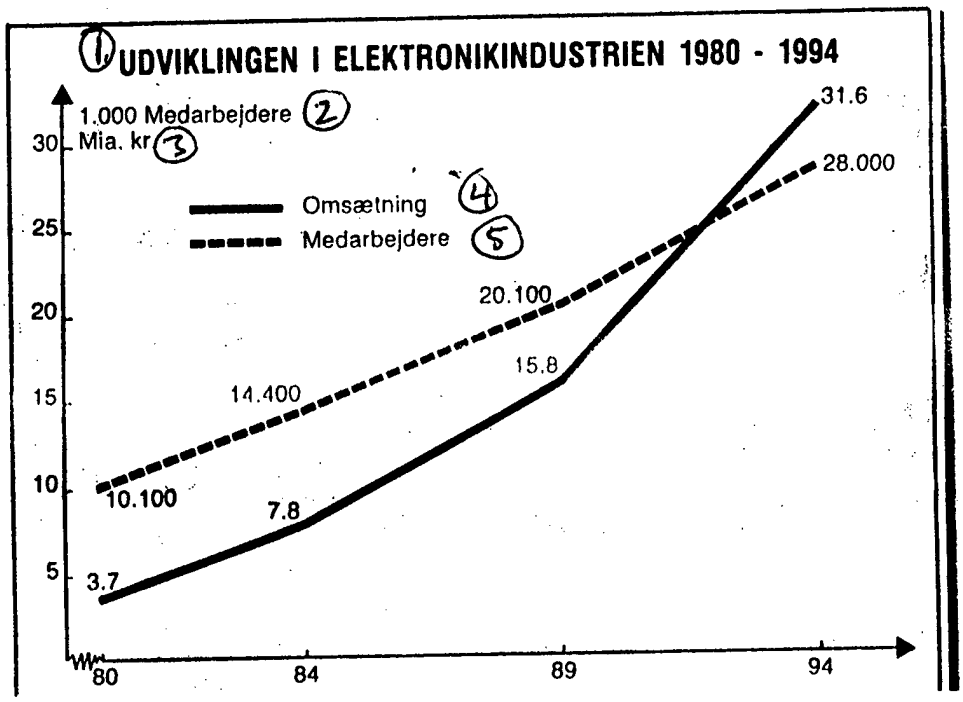
So optimistic is the Copenhagen electronics industry, the first study of Greater Copenhagen industry's expectations for the future shows.

It is the Initiative Council for Industrial Development in the Copenhagen Area which is behind the study. At the end of 1985 the executive committee of the initiative council decided to make a study of the electronics branch's expectations for development up to the middle of the 1990's. The study is based on the individual firm leaders' expectations. Sixty out of 80 firms within the electronics industry in Greater Copenhagen contributed to the study.

The electronics industry in Greater Copenhagen in the first half of the 1980's doubled its sales from four billion to eight billion kroner. Before the end of the 80's sales will again be doubled to 16 billion kroner, and this will be repeated to 1994, when sales are expected to be 32 million kroner. There will be 14,000 new jobs in the electronics industry, and several more with subcontractors up to 1994.

"This is not a peek into a crystal ball, but the sum of what firm leaders expect. But there was great agreement among those we spoke with," Director J.O.B. Lassen of the initiative council says.

The council was founded in 1985 by the 20 municipalities in Greater Copenhagen and Copenhagen County with the objective of promoting employment in the Copenhagen area, primarily in manufacturing firms.



1) Growth in Electronics Industry, 1980-1994
2) 1000 members of workforce
3) Billion kroner
4) Sales
5) Workforce

The graph shows the expected growth in the electronics industry in 1980-1994. The dotted line shows the growth in the workforce. The other line shows the growth in sales. Source: Danish Statistical Bureau together with interviews with 60 firms.

8831
CSO: 3698/615

BRIEFS

ESPRIT PROJECT 'AIDA'--Working in conjunction with Siemens, the prime contractor, and ICL, Thomson will participate in the Advanced Integrated Circuit Design Aids (AIDA) project. This project concerns the development of new design methods and CAD aids intended to support them. The cost of the AIDA project borne by the ESPRIT program is 33 million ECU (220 million francs), financed 50-50 by the partners and the European Community. Over a 4-year period, this activity represents approximately 300 man-years. Behind this project lies a medium term vision of integrated circuit development. Indeed, if in fact CAD aids now allow design of 100,000-transistor circuits, in the 5 years to come, technology will enable integration of several millions of transistors on a single circuit. The partners will contribute to this project based on their own know-how. Siemens will be in charge of drawing the masks and testing assistance, Thomson of the logic synthesis and user interface aspect, and ICL of the data management and system specifications aspects. [Text] [Paris MESURES in French 2 May 86 p 15] 12798/9835

ES2 TO LICENSE FRANCHISES--During the ongoing seminar series sponsored by ES2 (European Silicon Structures) in France, the company announced that franchise centers, that is, companies bound by a contract with ES2, would be authorized to resell ES2 products and services to small and medium enterprises. Cetia, a division of the Electric Signal and Enterprises Company (CSEE), which is allegedly currently in the process of becoming a subsidiary, was cited as an example of a franchise center. Cetia currently has two technical centers: a main center in Toulon located 70 km from the ES2 factory under construction at Rousset, Aix en Provence, and another center in Paris. In addition to these two centers, Cetia also plans to develop eight regional centers. Commenting on this agreement, Cetia specifically indicated that ES2's two software programs, ECHO and SOLO, would be used on its Unigraph work stations during the first quarter of 1987. In addition, during the seminar, ES2 provided price guidelines concerning the supply of circuits. Thus, 25 prototypes of a circuit measuring 4 mm on a side, with 2,400 gates and 48 pins, should be sold at a price on the order of 114,000 francs, for example. [Text] [Paris ELECTRONIQUE ACTUALITES in French 27 Jun 86 p 21] 12798/9835

THOMSON DIVISION DEVELOPS ASIC's--In order to provide better service to its customers, Thomson Semiconductors has just acquired an organization entirely dedicated to application-specific integrated circuits: This is the EFCIS unit which shall henceforth be called "Research and Manufacturing Center." It will employ approximately 400 persons. A design department for special circuits, such as those used in telecommunications or other areas, will remain, but all activities and development and manufacturing of standard circuits will be abandoned. This decision provides to Thomson Semiconductors the technical means, supported by an efficient marketing network, to gain a position on the application-specific circuit market. In fact, the company now holds 1.3 percent of the world semiconductor market, but only 1 percent of the tailor-made market. This niche is therefore a priority for Thomson Semiconductors which has fixed goals: to gain 3 percent of the world market for ASIC's by 1990 and 12.5 percent of the European market (the company now holds 3.7 percent of this market). In the same time frame, the share of ASIC's in the company's total gross revenues from semiconductors would grow from 8 percent (180 million francs in 1985) to 20 percent (2,800 million francs in 1990). With its vast range of technologies, both MOS and bipolar, the company already owns a major asset to aid its success (see ELECTRONIQUE INDUSTRIELLE No 88, p 35). Improving its research and production means will complement this asset, with investments of 100 million francs per year for equipment from now until 1990 in addition to the 300 million francs for development of application-specific CAD tools in the context of the European projects Sycomore and Aida (silicon compilers). [Excerpts] [Paris ELECTRONIQUE INDUSTRIELLE in French 1 May 86 p 81] 12798/9835

THOMSON, PHILIPS, SIEMENS COOPERATION--Discussions are now being held between Thomson and the two other large European component manufacturers, the Netherlands Philips and the German Siemens. They could lead to close cooperation in developing the microprocessors of the 1990's. The first project concerns the development of a 64-megabit chip, a project involving several billion French francs. R&D expenditure is indeed constantly increasing in this field. Thus, approximately Fr 4 billion was needed for the development of 1- to 4-megabit chips. The next steps toward further miniaturization will be even more expensive. Philips and Siemens understood this and started collaborating a few years ago. They received government support for this equal to approximately one-third of the above mentioned figure. The French group has just increased its stake. Thomson's headquarters has announced that cooperation remains open to other European partners (perhaps, especially to the British GEC [General Electric Company]) and could lead to a joint EUREKA proposal. The main idea is to stop the sterile intra-European competition at a time when the Japanese are taking the lead in both technology and trade. [Excerpt] [Paris ZERO UN INFORMATIQUE in French 16 Jun 86 p 84] 25031/12859

CSO: 3698/A184

PIRELLI DIVERSIFIES, ENTERS HIGH TECH MARKETS

Paris LA TRIBUNE DE L'ECONOMIE in French 12 Apr 86 pp 1,15

[Article by Roman correspondent Claude Kerman: "Pirelli's Electronics Adventure"]

[Text] After four years of patient reorganizing, 1986 marks the beginning of an adventure for the Pirelli group's "cable" division. This peaceful revolution has today placed Pirelli in a top position in one of the most promising sectors of the future, electronic optics.

Cables (primarily traditional ones) earned Pirelli 1.577 billion lira (7.2 billion francs) last year, or 43 percent of its total sales. With the explosion of optical fibers, lasers, circuit switches and digital exchanges in our daily environment, this sector is due to undergo profound mutations in the near future.

In four years, Pirelli has multiplied its international alliances and holdings acquisitions: in this way it has constructed a network ranging from control of the British FOCOM (electronic optical components), to active participation in the French VELEC (urban cable installation) and the American Litel (long distance transmissions) and David (fourth-generation private exchanges) and joint ventures with IBM in Italy.

This network is not yet complete. Mr Andrea Oddi, director of Pirelli-Cavi's electronic optics division, states, " In the immediate future, we are looking toward other innovations, such as the application of fiber optics to industrial automation."

The starting point forthis recent diversification of Pirelli's activities was the large-scale production of optical fibers (in its Battipaglia factory in Italy) for public telecommunications networks. "Expanding into the new private communications market was a natural progression," says Mr Oddi.

Aside from the power levels required, there is in fact no significant difference between these two types of networks. Both must provide an integrated system capable of converting an initial electrical signal into optical impulses and decoding them on arrival. Mr Oddi states that "Compared to classic coaxial cables, optical fibers offer 150 to 200 times more transmission power. In the future, we will even obtain power levels ten times as great with monomodal cables."

The first two Pirelli initiatives were carried out in Anglo-Saxon countries: in 1983, the group acquired 60 percent of FOCOM Systems Ltd., a small company created three years earlier in Leeds (G.B.) by four Xerox technicians. FOCOM, which today employs 60 salaried workers, specializes in the production of strategic electronic optical components (so-called "active" modulators) for network construction. The same year, Pirelli acquired a 20 percent interest in Litel, Inc., a Thiensville (Wisconsin) company specializing in construction of long-distance transmission networks. Litel has been given the job of creating a multiple-use network of this kind (voice, data transmission, optics) between Chicago and Cincinnati, which will later be extended to the main cities of Ohio, Indiana and Kentucky. "It is a cable circuit over 2,000 kilometers in length, to be laid before 1988," Mr Oddi explains, "It amounts to an annual investment of 17 million dollars." Pirelli has total responsibility for its design and installation.

In Italy, as part of a joint venture with IBM, Pirelli created a company in September called Boselli Sistemi SpA, whose task is to develop wide-band integrated networks for industrial use. The goal is to create a true, company-wide "nervous system", capable of overseeing security (systems guarding against break-in and fires, data protection), principal technological functions (heating, air conditioning, pumping systems, etc.) and control of energy consumption. "Boselli Sistemi is specifically intended to play an international role in this area, which explains our equal partnership with IBM.", Mr Oddi stresses. Symbolically, the new company will be headquartered in Bicocca, an industrial zone in the heart of Milan which Pirelli intends to convert into a showcase of Lombardic technology before the end of the year.

Still within the same line of thinking, Treficable, a Pirelli subsidiary, acquired 15 percent of the Tourcoing French company VELEC, which originally specialized in professional television systems. VELEC, which employs 360 people, is gaining dominance in the area of urban cable service, which already has 300,000 optical fiber-linked users in France. The company made 170 million francs in sales last year. If Pirelli's projects are brought to a successful conclusion, this figure should increase to 300 million francs. "We are planning on creating a Building Management division (provision of company equipment)", Mr Oddi says. Group headquarters in Milan also stress that VELEC's experience will be highly useful in creating a Bicocca pole: "the first embryo for cable-serviced cities in Italy."

The last piece in this scaffolding: the acquisition by Solari, a Pirelli subsidiary specializing in airport computerization, of the production and marketing rights for the David 8000 and its subsystems, a "revolutionary" digital exchange developed last year in Silicon Valley by a group of Italian Olivetti technicians that went over to the other side.

With the David 8000, Pirelli considers itself in possession of all the "bricks" to construct a complete, wide-band communications system, for both voice and data transmission, in a building or on an industrial site. The David 8020 in particular transmits high-speed data on the normal telephone network by using the same line for all its functions.

To this must be added the CSO (Electronic Optics Study Centers) established by Pirelli in seven countries (Argentina, Brazil, Spain, the United States, France, Great Britain and Italy) and which amount to centers for computer communications engineering companies adapted to the countries in which Pirelli operates. In Great Britain for example, FOCOM and the Pirelli CSO's are collaborating closely with Mercury, the large fiber optics network which competes with British Telecom. As for Solari, it plans to participate in the "Race" Community research program (on wide-band networks). In addition, Pirelli's primary interest is in possibilities for collaboration in the American SDI strategic defense in space.

"The field of electronic optics," Mr Oddi emphasizes, "is completely open. Within the next two or three years, the first totally optical "Switch" circuits (which will allow costly electricity-light conversion to be eliminated) will come out. As far as the price of transmission lasers is concerned, it should fall shortly from 10,000 to 1,000 dollars."

These research efforts place Pirelli in a good position for the future. In 1983, world-wide investments in fiber optics came to 300 million dollars, or 100,000 kilometers of cable laid. Moreover, the market has an annual growth of 40 percent. "We want to be there when the time is ripe with our cards up-to-date", says Mr Oddi.

9825
CSO: 3698/630

BRIEFS

ITALY INCREASES RESEARCH SPENDING--Rome--This year Italy plans to spend 10.211 billion lire on all forms of research (pure, applied, and developmental), a 39.4 percent increase over 1984, the last year for which final data are available. This entails an increase of 2.888 billion lire, of which 1.291 billion are allocated by public organizations (government, research bodies such as the CNR and ENEA, and other public institutions such as the universities) and 1.577 billion by public and private enterprises. A total of 760 enterprises will be involved. Also, there has been a qualitative improvement because investment expenditures in capital accounts (purchase of goods and services excluded) should increase by 43.5 percent. These figures were released by the Central Statistical Institute, which processed information supplied by the institutions involved. In 1986, pure research (theoretical-experimental research designed solely to obtain information) has experienced the greatest increase (52 percent over 1984 for a total of 1.77 billion lire). Applied research (new knowledge for specific uses) will increase by 45.7 percent (4.08 billion lire) while developmental research (innovation and production of new products resulting from acquired knowledge) will rise by 29.2 percent (4.361 billion lire). [Excerpts] [Venice IL GAZZETTINO in Italian 17 Jul 86 p 2] 8606/9312

FRANCE'S FIM IN DANGER--According to Christian Marbach, president of ANVAR [National Agency for the Implementation of Research], a drop in Codevi interest rates to 4.5 percent would permit the lowering to 7 percent of the interest rates on Industrial Modernization Fund (FIM) loans which are administered by ANVAR. As of 15 June 1986, however, the Rue de Rivoli [Ministry of Finance] had not yet given authorization to lower the interest rate from 8.75 to 8.25 percent. Next year FIM's destiny could be in jeopardy. The Martin report on the effectiveness of corporate subsidies, which should be finished soon, will permit accurate assessment. Christian Marbach asserts that FIM, which distributed Fr 19 billion in modernization loans in 1984 and 1985, costs the government nothing. In 1986 it will finance Fr 9 billion of investments, and in 1987 repayments on the initial loans will provide FIM with resources of Fr 5 or 6 billion. That will be quite adequate to modernize small- and medium-sized industries, but only them. [Text] [Paris L'USINE NOUVELLE in French 19 Jun 86 p 48] 25031/12859

CSO: 3698/A184

NORWAY IN EUREKA: FUNDS, PROJECTS, PLACE ON SECRETARIAT

Oslo AFTENPOSTEN in Norwegian 1 Jul 86 p 4

[Article by AFTENPOSTEN Correspondent Ulf Andenaes: "Eureka Joint Effort in More Permanent Forms: Norway Gets Seat on Secretariat"]

[Excerpts] More for Research

Foreign Affairs Minister Knut Frydenlund led the Norwegian delegation, while the director of the Norwegian Council for Scientific and Industrial Research, Doctor Inge Johansen, is the national coordinator on Norway's part. Frydenlund asserted in his speech that Norway will place special emphasis on computer technology, telecommunications, biotechnology, information science and the testing of new materials in industry. The Norwegian government will increase the budgets for research and development, Frydenlund said.

"We will prevent a splitting up into many small research circles and give high-technology firms more elbow room. But we will not have any large machinery. Eureka will be a catalyst," Frydenlund says.

Originally, 20 million kroner a year were set aside in Norway for Eureka and the program for the creation of new businesses in industry, but the Labor Party government added an additional 15 million. "This emphasizes that on Norway's part we judge Eureka and high-technology research as a venture area," Frydenlund says.

For the Norwegian authorities the Eureka joint venture is one possibility which lies open in the European context for making amends for our lack of membership in EC. Norway will gain a member of Eureka's secretariat, which is now being put together. The person who will fill Norway's seat will be designated in the near future. The secretariat will have its headquarters in Brussels, with France's Xavier Fels as its first chairman.

Norwegian Projects

Up to now two projects with Norwegian participation have gotten the go signal as Eureka projects. In one, Statoil and the Norwegian textile industry have gone together with a British company to develop a new type of pipe made out of a fiber-reinforced plastic material intended for oil operations at sea. In the

other, Veritas and French Aerospatiale are working together on a monitoring system designed to prevent accidents in industry and transportation.

Several other projects with Norwegian participation are in preparation. But not all have gone as intended. A joint project between Norsk Data and the French MATRA company for a new type of data processing technology was one of the very first to receive Eureka's stamp. It is now in the process of being shelved, because the Japanese have already forestalled the project with a similar product.

A total of over 100 projects have been proposed.

Not East Europe

All the non-communist states in Europe are members of Eureka. Iceland was admitted as the newest member. Some communist countries, first and foremost Yugoslavia, have expressed a desire for membership. This was denied on the basis that the difference in the economic system makes it difficult. On the other hand, East European countries will be permitted to participate in limited research fields.

8831
CSO: 3698/613

USSR CRITICAL OF SWEDEN'S NEW TECH TRANSFER REGULATIONS

Stockholm DAGENS NYHETER in Swedish 24 Jul 86 p 6

[Article by Bo G. Andersson]

[Text] Now, for the first time, the Soviet Union is officially criticizing the new law against high-technology smuggling that Sweden introduced on 1 June this year. Sweden has caved in to American pressure and the law threatens Swedish nonalignment, a high Soviet official says in the latest issue of NY TEKNIK, which comes out today.

It is Piskolov V. Vasilievich, assistant chief of the section for Western trade at the Soviet Foreign Trade Ministry, who is attacking the Swedish law.

"We are both disappointed and surprised that Sweden gave in to the American pressure," Vasilievich says in the interview.

The "law" of which the Soviet official speaks is the customs regulation that was introduced on 1 June of this year. As a result of this regulation, Sweden now has export controls on certain civilian high technology.

The goal is to prevent Swedish companies from breaking the strict technological embargo that the United States has placed on the Soviet Union and the rest of the Eastern bloc.

Regulations Of United States

The Swedish government felt compelled to establish this regulation after Asea's computer deals and the so-called container affair in which businessman Sven-Olof Hakanson broke export regulations of the United States on several occasions by selling American computer equipment to the Soviet Union.

Simply stated, it is now a crime in Sweden to break the export regulations of the United States and other NATO countries.

Piskolov V. Vasilievich reveals in the NY TEKNIK interview that, on several occasions before the customs regulations took effect, the Swedish government told representatives of the Soviet government how it would function and the reasons behind it.

One such occasion was during Prime Minister Ingvar Carlsson's visit to Moscow on 14 to 17 April this year.

"We were told on those occasions that the law would not damage Swedish-Soviet trade relations. But we have come to a different conclusion," Vasilievich said.

Negative Impact

"Even though the regulation is said to apply only to the United States and the COCOM countries, your own high technology is included, as well."

"After all, half the parts in a Volvo are from other countries, so that this law will certainly damage trade relations between our two countries. That is completely clear. The ability of your own companies to export products will be hurt most of all, however."

Piskolov V. Vasilievich believes that Sweden has now allied itself with the United States and its allies in the secret export control organization COCOM (all the NATO countries except Iceland, plus Japan).

The Soviet official admits in the interview that the technological embargo of the Western world is having a certain negative impact on the Soviet Union. The development of trade relations is delayed and the Soviet Union must turn to other countries to purchase the necessary products and must seek new partners for joint development projects.

Sweden was the last country in Western Europe that decided to regulate the export of civilian, as well as military, high technology.

9336
CSO: 3598/594

DANISH ADVANCED TECHNOLOGIES, MARKETS EXPAND

Participate in European S&T Center

Copenhagen BERLINGSKE TIDENDE in Danish 26 Jun 86 Sect III p 13

[Article by HG: "Danes Participating in Technology Center"]

[Text] Handelsbanken [Bank of Commerce] Director Bendt Hansen has been elected to the board of directors of a European research center which will attempt to promote research and development in industry.

The center, which has the English name European Business and Innovation Center Network, has the former EC commissioner for industry and research, Etienne Davignon, as its chairman. The center's work is based to a great extent on EC funds, and the objective is to stimulate research at research parks.

Handelsbanken has shown interest in shooting money into the research park in Århus, and in addition there is a possibility of the establishment of a research park on Zealand. It is because of Handelsbanken's interest in this area that Bendt Hansen was elected to the board of directors, which will also attempt to create a joint effort between research parks in EC countries.

ADP Export Grows

Copenhagen BERLINGSKE TIDENDE in Danish 28 Jun 86 Sect III p 5

[Article by Henning Gøtz: "Datacentralen Expects Enormous Export Growth"]

[Text] EC, Kuwait and Jamaica are beachheads in Datacentralen's prioritizing of future export markets. In the last couple of years the publicly owned firm in Valby has exported about 15 million kroner worth of electronic data processing systems a year, but this figue will grow explosively, the people behind Datacentralen's export success foresee.

The publicly owned Datacentralen company is now beginning to see results from the last few years' purposeful staking on exports of administrative ADP systems abroad.

Most recently, the 10-million-kroner order, reported recently in BERLINGSKE TIDENDE, for the construction of an ADP customs system for the Caribbean island state of Jamaica has finally been signed. Another systems export agreement for about the same amount is coming, and Director Viggo Rasmussen expects further orders for "a far greater two-digit-million-kroner amount" before the end of the year.

"Within the public sector Denmark is certainly the most computerized country in the world, and this helps us a lot when we are to introduce our ADP products out in the world," Viggo Rasmussen says, who has just returned home from an export tour in the USA.

"Without bragging, we are in a unique export position, for we are in a strong position just by referring to Denmark when we have to introduce our systems abroad." Viggo Rasmussen, who after Datacentralen's division into six so-called profit areas became director for general information systems and international business, for example, expects in the course of just a couple of years a multiplication of exports' present 15-million-kroner share of Datacentralen's total sales of close to 700 million kroner.

Beachheads

Chief Consultant E. Willem Vink, who is the everyday leader of Datacentralen's export division, adds that Datacentralen is using the order for Jamaica as a beachhead for further export orders in the entire Caribbean area, where Jamaica today is furthest ahead in the ADP field.

"A couple of months ago we secured ourselves a subcontract for EC's so-called Esprit program. This time we will develop 12 million kroner worth of systems for the EC Administration, and we regard EC as our second marketing beachhead," E. Willem Vink says. However, Datacentralen has supplied comprehensive ADP systems to EC agencies earlier.

Finally he sets off Kuwait as Datacentralen's third beachhead for increased exports to the entire Middle East area. "As early as a couple of years ago we constructed a complete CPR system for Kuwait, and at the moment we are excitedly waiting for whether Egypt will order a similar system from us." In addition, fingers are being crossed on Retortvej [Retort Road] in Valby for its being Datacentralen and not one of the firm's foreign competitors which will run with an order for supplying a comprehensive State economy system for a "Middle East country." Datacentralen's export people do not want to say more at the moment, but it is a question of an order for between 50 million and 100 million kroner, and, should the occasion arise, it will be the largest up to now on the export side.

The Far East also has Datacentralen's interest, but here the firm has joined, among others, ØK Data, Store Nord and Kampsax in the Daisy A/S marketing firm, which is trying its hand at the export of ADP systems to the ASEAN countries.

"And with this Datacentralen's 5 to 10 steady export colleagues at the moment do not have resources for more seeking-out activity," it comes concurrently from the two export people.

Incidentally, Datacentralen's balance sheet the other day showed satisfactory profit progress from a scant 10 million kroner in 1984 to 34 million kroner last year, which according to the leadership confirms the need for the division into independent profit centers, which was carried out as of January 1985.

8831
CSO: 3698/615

BRIEFS

FRENCH CREATE HIGH-TECH CENTER--A technology center named CASIMIR (Center for Support and Stimulation of Industry Through Innovation and Research) has been created at Clermont-Ferrand in Auvergne. This institution, conceived within the Ninth Plan by the government and the regional council, was developed around the two universities of Clermont-Ferrand, the special engineering schools, and the laboratories associated with CNRS [National Center for Scientific Research]. CASIMIR seeks to be a network providing skills to the companies of Auvergne. It is already active in the following fields: computer aided design and manufacturing, quality control and mechanics, polymeres and composite materials, data processing and CIM, industrial quality, agro-food processing, metallurgy, microelectronics and automation, and electricity. Twelve engineers and technicians are employed. The government has invested Fr 14.5 million in this operation for the duration of the Plan, and the region's share amounts to Fr 7 million. [Text] [Paris ZERO UN INFORMATIQUE in French 16 Jun 86 p 57] 25031/12859

CSO: 3698/A184

ORIGINAL METHOD OF CONDUCTING PHAGOCYTE TESTS DESCRIBED

Prague HALO SOBOTA in Czech 15 Mar 86 p 5

[Article by Otakar Stajf: "From One Drop of Blood"]

[Text] If someone arranged a poll asking the subjects to summarize in one sentence the most useful progress in medical diagnosis of this century, surely those in the know would name scores of revolutionary methods and instruments, from Roentgen's first application of X-rays at the turn of the century to today's computer-aided tomography. A layman would certainly not have it that easy. But if he drew from his own experience gathered as a patient during routine physical examinations and occasional hospitalization, maybe he would have concentrated his recognition of medical progress on that wonderful phrase--what can be read in a single drop of blood.

The invention to which I want to draw attention in the following lines has, mind you, on the front page of the patent application a very professional-sounding title--"Microparticles based on hydrophilic polymers and their use in immunology." But its (the investion's) mission is to contribute to the knowledge that specialists can already extract from that single drop of blood.

History

One hundred two years ago the famous Russian biologist, zoologist and bacteriologist Ilya Iljich Mechkinov published his revolutionary discovery of phagocytosis, the original function of which in single cell and primitive multicellular organisms was obtaining of food. In the course of evolution this function of cells has developed into a higher order mechanism for removal of dean and damaged cells, undesirable microorganisms, and other foreign bodies. Doctors have gradually learned to correlate cellular phagocytotic activity with defense mechanisms of organisms and their specific causes.

Present

Today, the test for phagocyte activity of peripheral blood cells is a routine part of examining immunological reactivity, as performed in immunology, allergy, and blood clinics in practically all of our larger medical centers.

It is the basic test for all medical conditions in which a deficiency in the immune system is suspected, and it is used as an important supplemental test in eluciadating reasons for failures in treatment of repeated or chronic infections, inflammations, and tumors.

This indisputably important text has so far only one substantial flaw. It is performed in our health and veterinary centers by no less than six different methods.

Principle of the New Method

On 16 December 1981, a three member team of young scientists from the Microbiological Institute and the Institute of Macromolecular Chemistry CSAV (Czechoslovak Academy of Sciences) submitted an invention application, describing in detail a new testing material and methods for its use in immunology. Dr Vaclav Vetvicka, Dr Lubor Fornusek, and Jindrich Kopecek later received an official author's certificate (No 223295), and in 1984 received a joint plaque from the UVSSM (Central Committee, Union of Socialist Youth) and the CSAV. Such joint plaques are awarded young researchers for genuinely outstanding scientific work. The invention of these young authors certainly falls into that category. What is the subject of this invention?

Microscopic particles of hydrophilic polymers 0.05-3.0 micrometers in diameter, prepared by irradiation-polmerization employing gamma radiation from a cobalt source, are the building blocks of the test material which is highly superior, from a number of aspects, to previously used methods of testing phaguryte activity. Hitherto, standard methods were dependent on phagocytosis of erythrocytes (mainly from sheep) or yeast, various types of bacteria, or microcrystals of cadmium or polystyrene latex. Each of these procedures had some specific disadvantages--in the first example it was the necessity to maintain a sheep so that the laboratory had a constant supply of fresh erythrocytes. All of these methods were relatively labor intensive, so much so that one laboratory technicial was capable of performing a maximum of fifteen analyses per day. Results were available no sooner than 3 hours after a blood sample was taken.

Advantages and Preferences

The phagocyte test, using micropaticles in accordance with the findings of the aforementioned young authors, cuts the working steps to less than half that of the previous methods. Results are available 90 minutes after blood is drawn. One technicial can perform 50 tests per day. The test is more precise, because of the elimination of many variables which influenced the results of the other methods. And what is very important--former tests required 1-5 ml (milliliters) of blood; the new method requires literally one drop of blood, or approximately 0.1 ml. Lower labor intensiveness, less energy consumption and decreased material usage translate of course into substantially lower costs. Consequently, the test makes possible the earlier and more reliable recognition of defects in the immune cellular component and, as a result, quicker and more accurate diagnosis and prompter and more effective treatment.

And What Next?

So what is keeping this new method from being put into practice? Use of a single procedure would bring more consistency into results and such standardization would be beneficial.

The young researcher shrugged his shoulders. Application of our microparticles is not plagued (as many other inventions are) by a lack of interest on the part of the manufacturers. The Institute for Research, Production and Utilization of Radioisotopes in Prague has already undertaken production. For the past 2 years, it has been preparing for the production of the MSHP (Microspheric Hydrophilic Particel) set of equipment for determination of phagocyte activity of blood leukocytes, which is presently supplied to the end user gratis. Cost of the set will be established in the first half of the year.

The mircoparticles, along with a description of the new test procedure, were successfully exhibited 2 years ago at the CEMA countries' exhibition at CAMEXPO in Mexico, last year at the world exhibition of young inventors in Plovdiv and at the International Radiobiology Symposium in Prague. This development is one of the seven outstanding Czecholsovak patents to be exhibited at the international trade show "Technology '86" in Moscow.

What matters though is that as many health care professionals as possible are introduced to the method described here. Their interest is sure to ensure commercial development and consequently, profitable production of the equipment.

13207/12232
CSO: 2400/224

ACTIVITIES, PLANS OF CSSR COMPUTER EQUIPMENT ENTERPRISE

Prague NETTO in Czech No 3, 1986 pp 10-12, 14

[Article by Eng Pavel Dvorak, director of PVT Prague: "Points of Departure and Goals of the Conceptual Activities of the Enterprise for Computer Equipment Prague"]

[Text] More than 30 years ago, the Enterprise for Computer Equipment Prague, PVT Prague [then called the Central Office for Record Mechanization], was founded, mainly for machine processing of social and economic information. Through the influence of the steadily growing needs of users for machine data processing and as a result of the functional and capacity development of the technical equipment, mainly the computers, it achieved recognized importance for the entire society in the field of automated information processing. In the departmental agencies of the Czech Statistics Office, its more than 70 central computers in the 28 computer centers of 8 kraj institutions provide computer and informational services to almost 1000 users to the extent of over a half billion korunas annually. The most important users socially and in terms of volume are the state statistics agencies and the agencies, institutions, and economic organizations within the realm of the national committees at all levels. In addition to this, PVT Prague processes information for automated management systems of other departments controlled by the CSR Government, for example, those for domestic trade and the Czech Geodetics and Cartographics Office. In regard to the territorial distribution of the computing capacity, data processing for local users is becoming more and more important, especially because their computing requirements are distributed timewise and they help to make for a more balanced utilization of the enterprise's computer equipment, which is overloaded at peak times by the recordkeeping tasks of the larger users.

The society-wide standing and authority of PVT Prague in jurisdiction over state statistics are regulated by the basic conclusions of the plenums of the CPCZ Central Committee, especially the 8th and 15th Plenums, and a series of decrees of the federal government and the CSR Government.

Specific tasks for the development of PVT Prague services were established by governmental agencies in the Set of Measures to Improve Management of the Economy After 1980, which were to work up and implement a project

creating a unified territorial network of computer centers for state administration [referred to hereafter as the JUS], and in the Main Directions for Further Development of the Set of Measures in the sense of CSSR governmental decree No 243/1984 and CSR governmental decree No 254/1984, which was to set up the JUS for the needs of central and territorial agencies in accordance with the created system of data banks. A principal directive for the user content of the PVT Prague computer services was also the CSR governmental decree No 145/1977 on the concept of creating an automated information system for the national committees [referred to hereafter as the AIS NV] in the CSR, the CSR governmental decree No 211/1982 on reporting on the current status and other measures in the creation of the AIS NV, and the decree of the leadership of the CSR government No 311/1982 on reporting on the results of analysis of the management, planning, and effect of economic tools, including reducing expenses for programming and the operation of the AIS NV in PVT Prague. The technical development of PVT Prague was directed by CSR governmental decree No 59/1984, referring to the decree of the CSSR governmental leadership No 32/1984 on a nationwide program for application of electronics in the national economy.

In accordance with the above governmental decrees and the basic political directives, the goal of the conceptual activities of PVT Prague is characterized by the tasks and problems connected with creating, supporting, and operating the JUS. This network forms a suitable framework and environment for optimum concentration, territorial distribution, and effective utilization of the computer systems and the transmission, terminal, and organizational equipment produced in Czechoslovakia or the CEMA countries. The JUS will carry out the following main tasks:

--the collection of primary data and checking on, modifying, and preprocessing it;

--transmission of data to the computer centers equipped with computers;

--data processing and its storage in data bases and data banks;

--distribution of data resources to the point of their utilization;

--user terminal access to information;

--connection with departmental computer centers and their data banks;

Organizationally, the JUS includes the computer centers of PVT Prague and PVT Bratislava and the user realm, which with their computer resources is supplemented by the territorial agencies of state statistics, the agencies of the national committees and organizations managed and administered by them, and the remaining user organizations. Thus the user realm is directly or indirectly connected to the computing, transmitting, and memory capacity of the JUS.

A typical property of the JUS is the uniformity of the organizational structure, the operating technology of the processing and storage of data,

the technology of data transmission, and above all, the computer, set up, transmission, terminal, and organizational equipment employed. The technical base is made up exclusively of equipment produced domestically or in the CEMA countries. This standardization of course is also thoroughly applied to the user realm as well.

Construction of the JUS is being centrally designed by the Research Institute for Social and Economic Information and Automated Management in Bratislava in cooperation with all network participants. For the period of the Eighth 5-Year Plan with projections up to 1995, a number of concepts and framework agreements have been worked out, especially where it concerns the concept of the automated statistical information system (ASIS) for the years 1986 to 1990, the AIS NV technical project for the entire CSSR, the concept of JUS development in the Czech Statistics Office department for the years 1986 to 1995, and the framework agreement of PVT Prague with the CSR departments. The concepts and agreements contain the objectives of accelerated application of the latest knowledge of science and technology to organizational work, to the technology of data processing on computers, and to communications between sources of data and their effective utilization.

Even though in the concepts of the previous 5-year plans, especially in the Sixth and Seventh 5-Year Plans, there was a generational transition from processing masses of data by batch and isolated methods to data banking and interactive processing, the development of our economy and electronics did not permit us to implement even half of the conceptual intentions. Today the conceptual intentions for the Eighth and Ninth 5-Year Plans therefore appear too demanding to us, economically beyond the capabilities of our national economy, and unrealistic in the capabilities of basically changing people's thinking, both in the processing and in the user agencies and organizations. Despite these fears, it is essential that we overcome these accumulated delays in the development of automated information processing, ensure that we achieve the material, financial, and personnel prerequisites in the plans, and move forward decisively, with high quality, and in a planned manner in implementing the construction of the JUS.

Within the restrictions of this article, one can only briefly outline the objectives which it will be necessary to achieve in order for the JUS to meet the tasks which society expects it to perform by the beginning of the 1990's. According to the political and governmental intentions mentioned above, the JUS is supposed to be the basis for a unified informational system with the capability of international information integration.

In order to achieve the conceptional objectives, a third-and-a-half generation computer of domestic manufacture, the EC 1027, is supposed to be installed and put into operation in all the PVT Prague computer centers. This standardization will make it possible to utilize both the uniform application of software, a uniform operations system for controlling processing and mutual communications, and a uniform method of carrying out preventive and breakdown technical care, and also a uniform technology for processing and storing data in data bases and data banks and a uniform

interactive method of access to the computer capacity and the stored data resources. The territorial network of 28 computer centers of PVT Prague is supplemented by several dozen computer work areas, mainly in the cities, where there are no computer centers. Being located directly with the users shortens the communications path of the data and makes it possible to test out the input data and modifications and, in some cases, setting up and preprocessing it, and the transmission of clean data for further processing. The employees at these computer work areas should also take part in the discussion and consultation activities for the users and in technical maintenance of the terminals and other user terminal equipment. The computer work areas will be a useful area for direct application of mini- and microcomputers in specialized computer organizations outside the larger systems. Another sector for employing this modern computer equipment will be the setting up and testing of data and long range transmission of data through the telephone network. Local and long-distance terminal networks will also be built in PVT Prague around the third-and-a-half generation computers. In addition, there will temporarily be created a subsystem for long range data transmission for effective and economical provision of long-distance transmission of data groupings of input and processed data as well. Through the gradual connecting of the terminal networks with the data transmission subsystem, a computer network will come into being.

A basic variation of this subsystem is already in existence and is being used for the transmission of statistical data between the kraj and the center through the use of noncoupled transmission "magnetic tape to magnetic tape" over the switched telephone network. At this time the EC 1010 computer or the SPU 800 terminal are being used as terminal equipment. During the course of the Eighth 5-Year Plan, this equipment will be replaced by minicomputers of the SMEP series, which will make it possible to create a network with operations coupled with the computers.

The third-and-a-half generation computers and the minicomputers employed for various services in the PVT Prague computer centers network are changing the existing technology of automatic data processing. Isolated processing of office records in batches will be optimized by the utilization of the data bank mode which makes it possible to connect today's disassociated and repetitive data groupings into suitably organized data bases and by means of local and remote terminal inputs and outputs will make possible updating of the stored data practically in real time. The user participation in the actual processing will thus be increased and the computer will become a routine working tool for management and administration. Interactive access to the data bases and computing capacity opens up the way for a further expansion of the PVT Prague services, especially in the field of designing using computers [CAD - Computer Aided Design] and supporting production through computers [CAM - Computer Aided Manufacturing]. The new services also support the effective utilization of the computer capacity in those time periods when they are not used for batch processing of records [accounting, statistical, and operational].

The user world is also being prepared for broader and more effective utilization of the computer equipment. The preparatory period has already

been substantially completed and, for almost all user areas, projects and the concept of technical support and organizational provisions for cooperation with the JUS have been worked out. According to the projects, in the next few months the territorial units of the Czech Statistics Office will be equipped with minicomputers which on the one hand will replace the existing remaining calculating machines and on the other hand will permit the processing of small and operational statistical tasks. In addition, it will expand the qualified collection and verification of statistical surveys and the transmission of the verified data groupings through the long range data transmission susbystem for processing of larger summaries and statistical reporting for upper management. This area is already being prepared in accordance with the approved project for implementation in the form of a terminal network for upper management in which all higher points will be connected by terminals with the central data bases and the computer systems. The JUS makes it possible to perform integrated processing of statistical data from the lowest reporting unit up through utilization in the center.

According to the concept for technical support of the AIS NV, in the user realm the national committees and the organizations managed and administered by them will gradually be equipped with mini- and microcomputer equipment, which again will make it possible to supply the operational information needs directly at the point of usage, especially the collection and preprocessing of input data for processing of okres, kraj, or republic aggregations and reports with the simultaneous capability of information feedback to the original user. The AIS NV technical project precisely defines the boundaries in the information processing system of the national committees between the user realm and the JUS, which the PVT Prague represents. Good functioning of the information system is ensured by the uniform standardization of the set of applications programs according to which the main jobs are processed [wages, accounting, and budgeting of the national committees, capital assets, and material distribution] and by the uniform specifications for technical equipment at all levels of the national committees and the organizations managed and administered by them. According to a uniform schedule of work, the length of time spent in the field of setting up and verifying input data is also provided for. The national committees and the organizations managed and administered by them are building their own user computer centers or utilizing the services of the already mentioned computer work areas of PVT Prague. The technical equipment will gradually be oriented toward direct terminal connection into the JUS.

Similar procedures and solutions are being prepared and implemented in the remaining user areas as well. Moreover, within the framework of the state target program of application of electronics, there was another specific intention laid out conceptually, which is to check out experimentally the collective utilization of computers in the unified territorial network in the East Bohemia Kraj. It is supposed to increase the utilization of computer equipment in those cases where the individual organizations cannot make use of the full capacity of the computer for just their own work, at least at the level of the nationwide average. The results of the

experiment will be used both to make the concept more specific in future years and in implementation of the JUS.

In conclusion, I would like to mention the distant goal on the horizon for the end of the second millenium. After 1990, the functions and operational activities of the public data network of the communications administrations, which is supposed to provide assured communications and transmission services for the JUS on the technical basis of digitization and optoelectronics, should gradually grow and stabilize. After achieving the necessary reliability level, the JUS should begin working within the framework of the unified nationwide information system as a source database system in the realm of social, economic, and administrative information and as the computer capability for the general informational, consultative, and technical services.

6285/12899
CSO: 2402/25

POLISH COMMENTARY ON UNIFIED CEMA COMPUTER TERMINOLOGY

Warsaw WIADOMOSCI STATYSTYCZNE in Polish No 1, Jan 86 pp 41-42

[Article by Dr Jan Iszkowski, National Statistical Data System, Central Office of Statistics: "Data Processing in Statistics: Computers, Minicomputers, Microcomputers"]

[Text] The terms given in the title are in general use, and yet it is not easy to answer the question of just what difference there is between them.

As a result of the difficulties in defining classes of computer equipment, an arbitrary classification into large and medium-sized computers, as one group, and minicomputers as the other, has been applied in the past in the statistical studies of data processing centers. This classification is made by designating as minicomputers the specific makes of machines named in the list of computers appended to the instructions. When this list was compiled, minicomputers were assumed to be basically computers with an internal memory capacity of more than 2 kilobytes and less than 64 kilobytes. Computers with a larger memory capacity were considered to be large and medium-sized computers, and those with a smaller memory microcomputers. With the passage of time, the classification based on this list increasingly diverged from the internal memory capacity categories indicated, and the classification differences based on the computer list became fairly significant in relation to the classification based on internal memory capacity.

In 1984, of the total number of 2,844 computers included in section 7 of the report on form A-01 (computers with a memory capacity greater than 8 kilobytes to which an external storage device can be connected), there were 2,002 minicomputers and 1,950 computers with an internal memory capacity of 8 to 64 kilobytes.

The objection was raised in this connection that the internal memory capacity cannot be the only, or even the basic, criterion for classifying a computer as a large or medium-size computer, minicomputer, or microcomputer.

The internal memory capacity of personal microcomputers, among others, now often considerably exceeds 8 kilobytes, and external memory devices can be connected to them. Hence doubt has arisen as to whether such computers should also be included in section 7 of report A-01.

Similar doubts have arisen in other CEMA countries, even though a different classification of computers has been employed in each of these countries. This has rendered it impossible to make international comparisons in the matter of the size and utilization of the computer pool.

To arrive at comparability of such data, the CEMA Permanent Statistical Commission on Cooperation in the Area of Statistics launched the initiative of devising a suitable system of indicators and classification. The Hungarian delegation assembled the materials on this subject and prepared them for examination.

A conference of statistical specialists was held at the CEMA Secretariat in Moscow in June 1985. A system of indicators characterizing the employment of computer equipment at the level of the national economy was considered and agreed on at this conference.

Among other things, the following definition and classification of computers (electronic computing machines) were adopted at this conference.

An electronic computing machine (in Russian, elektronnaya vychislitel'naya mashina or EVM) is a self-contained automatic machine for data processing, or an automatic digital device for data processing, designed for specific purposes or for general use and connected to a peripheral device whose storage capacity exceeds 16 kilobytes. This classification includess the electronic computing machines of the Unified System and the Minicomputer System of the socialist countries and machines similar to them. This definition does not apply to microprocessors and computing machines not adapted for self-contained data processing and incorporated as integral components into programmed industrial equipment with a read-write device (Russian ChPU), transportation equipment, or other machinery or equipment. Nor do statistical records include computer devices whose removal from equipment causes both suspension of operation of the eqiuipment and of the computing machine to the extent that restoration of serviceability is possible only by carrying out major repair and assembly operations.

The operating (internal) memory capacity of an electronic computing machine is understood to mean the physical memory capacity of the machine in existence at any given time, as expressed in megabyte units. In the case of machines in which data are not organized into bytes, conversion is to be carried out on the assumption that 8 bits equal 1 byte.

The classification of electronic computing machines is defined as follows: general-purpose electronic computing machines (of the Unified System type and similar machines), and mini and micro electronic computing machines (of the Minicomputer System type and similar machines) ("Minutes of the Conference of Statistical Specialists of the CEMA Member Countries for Consideration and Agreement on a System of Indicators Characterizing the Use of Computer Equipment at the Level of the National Economy of the CEMA Member Countries, Moscow, 11-14 June 1985").

In connection with these findings and following solicitation of the opinion of the authorities concerned, including in particular consideration of the recommendations of the Office of Scientific and Technical Progress and Practical Applications, it was decided to amend the wording of the

instructions relating to the report on form A-01 (annual report on data processing center activities) as regards the scope of section 7 of this report (computers and input/output and data transmission devices connected to them), as well as the computer terminology employed (Order No 61 of the President of the National Office of Statistics of 30 October 1985 amending an order relating to statistical studies of data processing centers).

1. The term to be applied to all computer groups (that is, the previous large and medium-sized computers, minicomputers, and microcomputers, is electronic digital machines (Polish elektroniczne maszyny cyfrowe, EMC). This is the counterpart of the Russian term referred to, elektronnaya vychislitel'naya mashina (EVM). It is important not to confuse this general designation with the term "computers," which refers to the groups previously called "large and medium-sized computers."

2. The lower limit of EMC internal memory capacity has been raised from 8 to 16 kilobytes as a qualification for inclusion of such machines in section 7 of report A-01, which section also does not include machines with a larger internal (operating) memory having no separate permanent operator servicing and for which records of run time and down time are not maintained. This means that the section in question will include both computers (previously "large and medium-sized") and minicomputers and microcomputers meeting the requirements referred to. The classification of EMC into computers, minicomputers, and microcomputers will be adopted in the statistical publication issued each year by the Central Office of Statistics (OBR SPIS).

3. The definition of the individual computer groups established at the conference of specialists at the CEMA Secretariat has been adopted for practical individual national application, but it is acknowledged that extensive refinement of the definition is needed. Consequently, the following term will be used in data processing center statistics: electronic digital machines (EMC), in accordance with the CEMA definition of electronic computing machine, with the addition that they are further classified into computers, minicomputers, and microcomputers.

Computers are general-purpose EMC of the Unified System (JS), the Odra 1300 system, etc, as, for example, the R-32, ICL, IBM, and so forth. They are EMC having an expanded configuration of input/output devices and external storage devices permitting the entry, processing, storage, and output of large sets of data. This configuration includes at least one input device with a paper data carrier (80-column punch card reader or 8-track paper tape), three storage devices using magnetic tape 12.7 millimeters wide, and one line printer with a speed higher than 500 lines per minute.

Minicomputers are EMC characterized by a less extensive input/output device configuration that to a certain extent limits the size of the data sets that can be entered, processed, stored, and output. They must, however, have generally one input device using a paper or magnetic carrier (of medium speed), no more than two storage devices using magnetic tape 12.7 millimeters wide, and one printer capable of printing at a speed higher than 150 characters per second.

Microcomputers are EMC characterized by an input/output device configuration so small as substantially to limit the size of the data sets which can be entered, processed, stored, and output. These limitations are assumed to be that the basic data input device is an alphanumeric keyboard operated in conjunction with a screen monitor, that the basic data output and display device is a screen monitor, that the possibility exists of connecting only miniature external storage devices using magnetic carriers (tape 6.35 and 3.17 millimeter wide, floppy disks 5 inches and 3-1/2 inches in diameter, hard disks of the Winchester type), and a small-sized printer with an print speed of up to 100 characters per second and a plotter, and that external memory devices which operate with magnetic tape 12.7 millimeters wide or external memory devices with replaceable disk cartridges are not used.

In presenting information on these new determinations, I would like to express my opinion that the most faithful possible adoption of these determinations in the data processing terminology employed in Poland and corresponding modification of the pertinent divisions (0921 and 0922) of the Classified Product List (SWW) and the classified lists based on the SWW would be advantageous. Use of these terms in the statistical studies of data processing centers for 1985 might contribute toward further refinement of the terms, but I hope that there will now be little doubt regarding the classification of EMC. The process of refinement of meanings will depend to a certain extent on the general spread of microcomputers throughout Poland and on further progress in their design, equipment, and technical capabilities.

6115
CSO: 2602/46

SPECIALISTS INTERVIEWED ON HUNGARIAN COMPUTER PRODUCTION

Budapest OTLET in Hungarian No 21, 22 May 86 pp 14, 15

[Interview by SZ.P.: "Production Lines"; date and place not given]

[Text] Hundreds of articles and studies, TV programs and radio reports have been devoted in recent years to the problems of our computer industry. Outright or implied, they all asked the same question: do we need a computer industry? Below we bring you interviews with four specialists, each of whom is engaged in a different aspect of the industry and considers the problems from a different angle: Laszlo Pal, group head of the National Technical Development Committee, Dr Sandor Mihaly, recently retired director general of Microelectronics Enterprise, Adam Tertak, manager of the Joint Undertaking for Computer Systems Sales, and Istvan Erdesz, departmental head of the Computer Customer Service of Telecommunications Cooperative.]

"...a few years ago almost everybody considered the whole thing a rich man's toy."

[Question] How do you see the exploits, so far, of the Hungarian small computer industry in the light of its potentials and its results achieved?

Istvan Erdesz: Our domestic computer industry--and this includes the category of so-called small computers or microcomputers, too--is not one of our success stories in the international arena, and to say that it is "imitative in nature" would only be skirting the truth.

Laszlo Pal: Our domestic small computer manufacturing program, which got its start in the early 1970's has, in the course of the past 15 years, been contributing steadily increasing revenues to our nation's economy. Thousands of small computers made by VIDEOTON and KFKI are operational in our country and in the European CEMA countries. A great majority of these users are satisfied with the machines' services. The fomenting of production was undertaken without capital investment subsidies on the part of the state, simply by the enterprises' own valiant efforts. Their key problems at this time are a lack of resources necessary for a technological renewal and a lack of unity on softwear development.

Adam Tertak: The first question in connection with Hungarian small computer manufacture is whether or not we may speak at all about large scale and reliable serial production. We produce about 90 varieties of 30 different basic models, mostly by manual methods. In the fragmented Hungarian manufacturing market, it will probably take a long time before the producers begin accommodating the consumer.

Dr Mihaly Sandory: Positive aspects: the industry, (especially VIDEOTON) has realized several times 10 billion forints in the course of the past decade in essentially net income in this specialty--starting from practically zero in the 1960's. Our domestic small computer application culture underwent great development in the 1970's. This is largely due to the efforts of the Hungarian Academy of Sciences (and under it, primarily the KFKI and the SzTAKI.) Negative aspect: the medium and large size computer application remained on an extremely low level due to a limited choice of models available.

[Question] Hungarian computer industry has had a series of failures in the manufacture of microcomputers, partial successes in the production of small machines and good export results in peripherals. Would it be worthwhile and would it be possible to develop in all three directions?

Laszlo Pal: Hungarian computer industry can boast of significant export successes in both small machines and peripherals. In the development of microcomputers we can speak of partial successes, while in face of very strong import competition, lack of imported components, and due to financial difficulties, we must speak of failures in production. We have the know-how and, to a point, the technologies to manufacture microcomputers, but to be successful, we must organize several external factors.

It is necessary for us to continue the product and production development activity in all three directions, and the yearly 10 billion forints production volume of our computer industry will afford selective and profitable development of our computer technology products in all three directions mentioned.

Adam Tertak: The question is wrong. If it were worthwhile to set up computer manufacturing plants in Hungary or to boost their production, then the marketing of appropriate configurations would be essential. Knowing KGST's tendencies, Hungarian manufacturers would have either to resort to imports, or produce the needed peripherals themselves.

Dr Mihaly Sandor: The assembly of small computers and microcomputers would only pay if it were done on a timework basis, with the exception of that category which is under commercial restrictions, and is therefore not available on the international market. To be sure, I do not think that we can muster our own means to finance the tooling-up for large-scale serial production, whereas foreign capital and know-how might be available to support timework assembly operations.

I consider it a must, within our financial limitations, to develop the manufacture of peripherals (and of any industrial activity where the cost of creating a work place is rather high, but the profit realized in the work place is commensurate with such costs and, at the same time, the distribution of the volume of goods produced is within our marketing capabilities.)

Istvan Erdesz: The statement "series of failures" is incorrect. One must simply realize the special situation of the Hungarian economy and the fragmentation of the domestic market, and one can at once evaluate the present situation more realistically. In spite of this, the domestic establishment and continued development of a certain fundamental computer industry base is unavoidable.

[Question] Hungarian consumers harbor a great deal of mistrust toward domestic computers and peripherals. What might be the reason?

Adam Tertak: The main reason for mistrust is quality and an underdeveloped service system (viz. consumer sphere) much neglected by the manufacturers also. Furthermore, it is difficult to tell-because of the high percentage of components that need to be imported--just what qualifies as a domestic make.

Dr Mihaly Sandory: The contractual and technical reliability of domestic suppliers is intolerably inadequate. From this point of view, suppliers are simply irresponsible. However, this lack of resonsibility is not some sort of subjective factor but is, itself, an effect: life, taken in the complex sense of the word, has gotten suppliers inured to irresponsibility and, many times, has forced them to live with it as a matter of course. It is not possible to change this by statements or decisions; what is needed is the creation of favorable circumstances.

Laszlo Pal: We are not--and, objectively speaking, we cannot be--in the forefront of computer products manufacture. Hungarian computer technology industry, in itself, simply does not have the necessary concentration of scientific know-how, component supply and investment capital, which form the cornerstone of competitiveness (KGST's complex program, too, will need long term readjustment in order to change this situation.) At the same time, as a result of the openness of our economy, our computer industry will, on the domestic market--especially with respect to microcomputers--have to face the top manufacturers of the world. Under such circumstances it is understandable that our domestic consumers prefer the imported machines.

Istvan Erdesz: The existing mistrust resulted from realistically certifiable poor experiences, however not primarily in connection with computer technological products, but rather in connection with other products of the electronics industry. Other than that, a mistrust vis-a-vis domestic products is a fashionable and erroneous idiosyncrasy which one must overcome, since in many instances the equivalent domestic make possesses better parameters and is technologically more reliable than the foreign product which, in its appearance, may look handsomer.

[Question] The most frequent charge against Hungarian computers is that they are expensive. In view of well-known cheap labor costs and fast declining component prices, the large price tag, to say the least, is difficult to accept. But if components as well as labor costs are cheap, how come Hungarian computers are nonetheless expensive?

Istvan Erdesz: "Cheap labor" and "fast declining component prices" are phrases repeated ad nauseam and are, unfortunately, untrue. Our domestic component base does not produce computer components of suitable quality and in sufficient quantities. In the case of a machine which can be put together from components purchased from a variety of sources, the price of just the components alone is higher than the price of a complete Western unit produced on the assembly line. The so-called cheap labor on the other hand, under our present circumstances, is not cheap at all; due to a lack of suitable technology, because of limited productivity and lax labor discipline and many other problems, cheap labor happens to be very expensive indeed!

Dr Mihaly Sandory: The price levels of our domestic computer industry are determined by our system of protective tariffs rather than by the costs of production. As long as computer imports (e.g. imports that do not affect the foreign exchange balance of the private sector, i.e. the people's economy) are subject to customs duties, and as long as foreign exchange refunds are not accorded anybody who imports such units either for his own purposes or for resale, instead of spending the foreign exchange bought for a trip abroad or given for an official mission, or perhaps earned in the course of employment abroad, on drinks, price levels will stay the way they are.

Laszlo Pal: Not even the "charge" is put correctly. Hungarian computers are not expensive, just cost more than the imports. It might be worthwhile to make a comparative study in OTLET regarding the progress of ratios between domestic and import prices--let us say between 1981 and 1985. (Our readers had occasion to see such comparisons in the July 11 and July 18, 1985 issues of our publication and on page 16 of this very issue as well. The Editor.) It would become evident that the prices of domestic products decline at about the same rate. Besides, there are many objective and some subjective reasons for the high domestic prices. Some of these: in the domestic market the component prices do not (alas) decline so very fast; because of shortages in investment capital and weaknesses in the technological and componentry backgrounds, and also as a result of the fundamental conditions of the market, domestic industry can produce only smaller series than its actual potential would permit; domestic industry must amortize hardware and softwear research and development investments by the use of relatively limited production results, etc.

Adam Tertak: The prices for Hungarian machines are determined by the grey-market situation in the same way as those for any other products (e.g. videos, etc.) The rumor that component prices are fast declining in the Hungarian economy is not true, since the essential components cannot be acquired from socialist sources. At the same time Hungarian import regulations are incapable of bringing about a decline in component prices. Major Hungarian manufacturers base their calculations on KGST exports and do not consider the

supply of the domestic market as their primary objective which, by the way, is not being supported by our economic system either. Besides, Hungarian wages and labor costs, because of the last few years' restrictive regulations, cannot be referred to as low by any stretch of the imagination.

[Question] In today's situation, so full of contradictions, what future do you foresee for the Hungarian computer industry?

Laszlo Pal: The future of the Hungarian computer industry depends on too many factors for me to try to prophesy. But I can inform our readers that the OMFB has worked up plans in various versions for the development of the computer industry and for each version we have also determined the necessary state regulations. The variations in connection with the future of the computer industry were worked up as functions of the component industry, the research and development resources, international licensing connections, capital investment possibilities, anticipated fluctuations in domestic and export market capacities, changes in internal structural ratios, technological and systems-technical cooperation with the electronics industry as a whole, the mobilizability of softwear capacities, as well as the modalities of developing a proper service network. Based on an examination of the said variations, we are convinced that there are several possible avenues for further significant growth in our computer industry.

Istvan Erdesz: Domestic computer manufacture is an indispensable part of technological development. The government program announced in connection with the development of the electronics industry is aimed at alleviating the industry's problems which--we trust--it will accomplish.

It would be immodest and superfluous to make predictions about the future and to analyze the computer industry's theoretical problems. It is much more useful to try to find solutions to the known problems and to endeavor, within the limits of our own possibilities, to create a situation in which, in the not too distant future, it will become redundant to pose any such questions.

Adam Tertak: Instead of predicting the future, I want to offer just a few thoughts: standardization; purchasing of licenses and patents; restriction and taxation of private and other imports; use of taxes collected for the purchase of components and manufacturing licenses; increased subsidies;--and one should realize once and for all that manufacturing is not the same as doing handicrafts.

Dr Mihaly Sandory: The electronics industry--and within it, the computer industry--is in a dramatically serious situation. For an entire decade it was unable to make use of even that portion of its net earnings which it needed for self-preservation, as a result of which its tools became obsolete, its productivity is on a low level and, as of this moment, even the know-how of the skilled workers engaged in the electronics industry can only be described as antiquated. Yet, I am an optimist: the situation cannot get much worse before it starts to get better. A notion is beginning to spread, namely that electronization is a necessity (note that many of those who put great emphasis on this now, a few years ago still considered the whole thing a rich man's toy) and that the electronics industry would place a very advantageous burden on our national energy resources (provided we let it exist and develop.)

POTENTIAL SCHOOL COMPUTERS TESTED BY EXPERTS

Competition Announced

Budapest OTLET in Hungarian No 21, 22 May 86 p 19

[Excerpt] [Announcement of Competition for the Delivery of Personal Computers for Use in Public Primary and/or Secondary Schools]

Subject of Competition

The personal computer is to be used for educational purposes in public primary and/or secondary schools. The personal computer has to be available in large quantities for forints and its supplier must warrant service.

Because of differences in educational requirements we indicate below under

a) technical requirements for public primary schools;

b) technical requirements for primary schools.

Bids may be submitted for personal computers for use in both types of schools or in either type.

Minimum specifications of the basic model:

- BASIC interpreter in ROM;

- BASIC command and instruction set at least as specified in the appendix;

- open storage capacity (program area) minimum

a) 12K

b) 30K;

- storage expansion capacity (unless the basic model is at least 48K);

- the character set must include all 35 characters of the Hungarian alphabet in upper and lower case. Character positioning on the lower three rows should preferably conform to the standard 44 key typewriter (MSz 7799/1-82).

- display with a minimum of 4 colors (plus black and white.) The colors should be easily distinguishable even on a black and white monitor;

- sound generation, at least two channels, a range of 5 octaves, programmable sound volume and wave form;

- built-in parallel (Centronics) printer interface. Bidder to submit bid on adaptable printer, featuring accented letters as well;

- provision for connection with floppy disk drive, with control from BASIC;

Other Requirements

- impact resistance (in the event of plastic housing);

- maximal reliability at maximal use (a minimum of 10 hours running time, children hitting keyboard, etc.);

- user friendliness, unambiguous wiring system, unambiguous signs;

- functional design.

Conditions of Competition

The bidder must submit to the Institute for Science Organization and Data Processing by 30 December 1985, two units of a production model (not a dummy, rather a prototype suitable for mass production) along with instruction manuals.

The bidder commits himself--in case his bid is successful--to produce and deliver a minimum of 1,000 machines per year at least through 1988.

The bidder must fully guarantee the units delivered and assure their maintenance through a nationwide service network.

Miscellaneous

The competition will be adjudged by 28 February 1986. The Institute for Science Organization and Data Processing commits itself to place orders for lots of 1,000 units each of the accepted personal computers in 1986.

Budapest, 8 October 1985.

Institute for Science Organization and Data Processing.

Judging Computers

Budapest OTLET in Hungarian No 21, 22 May 86 pp 18-29

[Article: "The Computer of the Future on the Rack"]

[Excerpt] This bombastic title suggests simply that an unusual kind of interrogation follows. Unusual, too, because, since our interrogation will not be using conventional methods, we will not investigate machines well known to the inquisitors from their own experience and, what is more, we did not even know in advance what we would be investigating. We were promised only one thing for sure: we would be closeted for 8 hours in a room with six different computers. A promising start, wouldn't you say?

The Call for Bids

We asked seasoned and expert torturers to be our inquisitors and prior to the big day we even held a strategy meeting. It was at this meeting that we finalized our torture system, other possible changes, individual tasks. We also decided that--though we know the wording of the original call for bids--we would not stick to its various points. It was our opinion that the original competition specified requirements for the machines to meet according to a certain set of points of view, whereas we look at things from a different point of view. This means that in certain instances our scope was wider, and in others, narrower. But we think it most important that the reader be fully aware of the circumstances and requirements of the competition. That is why we publish the call for bids in a somewhat excerpted form.

The call for bids, then, is quite detailed and covers considerable ground, yet we decided that each inquisitor should decide for himself just what is required to make a good school computer and to grade on that basis. (E.g.: whether a computer can operate with a line printer or a parallel printer is, in our opinion, irrelevant. What matters is that a printer be available.)

Methods of Interrogation

This inquisition represented an entirely new task for us. Our inquisitors have, in the past, graded only machines well known to them, but now they had just a few hours to get acquainted with six different models as thoroughly as possible. It is evident that so little time is not enough to ascertain in a new machine, for example, the possibilities and pitfalls of machine-coded programming. Unfortunately not even considerably simpler things either. In order to work more effectively, we invented in advance and distributed certain tasks. For example, to test the reliability of data storage and processing, one of our inquisitors worked out a program which we hope to adapt to and, of course, to execute on each machine. However, by the time we got over the cassette faults and programming problems with the first machine, we had wasted so much time that we had to quit; we ran out of time. We had no separate torture test for the calculation and data processing speeds of the machines, but they contributed to a more comprehensive criterion for grading and for that reason we ran a

benchmark type test program on all the units. We do not publish the list of the programs at this point, since they appeared some time ago in BIT-LET (and recently in Szuper, too!) just the test results in a separate table.

Benchmark Results

	BM1	BM2	BM3	BM4	BM5	BM6	BM&	BM8
TV Computer	1.75	8.11	21.31	28.22	30.65	43.44	57.8	256.5
Homelab 4	0.9	5.3	10.7	10.7	12.7	20	30.72	45.2
HT 3080C	1.2	5.82	13.74	14.12	15.5	24.11	37.22	57.29
Commodore 16	2.0	9.91	18.35	19.11	21.42	35.02	55.61	101.37
Microdat	1.3	8.5	16.0	17.8	19.1	28.6	44.8	107.0
Pro-Primo	1.75	8.11	19.1	19.95	21.84	34.82	53.19	83.28

The Machines

The great day dawned, we signed the necessary papers and we were permitted to make the acquaintance of the six machines. Our hunches proved correct despite the secrecy, although it is true that what we now met were advanced models of the machines. Thus in the end there was only one machine which our inquisitors had known already, the Commodore 16, which had been previously interrogated by us. The rest were basically unknown to us, though we may have seen their predecessors.

TH 3080C

This is a new product of Hiradastechnika Szovetkezet and an advanced version of the HT 1080Z. It is a machine with colorful new potentials, mechanically identical with its predecessor and with a built-in tape recorder. The usefulness of the machine is multiplied by the fact that by the use of an emulator program--which comes with every machine--it can be transformed into a Sinclair SPECTRUM. Make no mistake, it is not compatible with, but actually "identical" with the SPECTRUM which, with one stroke, permits an infinite number of existing programs to be run on it.

Size: 540 x 390 x 120 mm
Weight: appr. 3 kg

Commodore 16

We found no novelty or surprise in the machine, although we had hoped to find a memory expander with it. In one respect, of course, it differs from the original basic machine, but this we considered quite natural: it features the accented Hungarian characters.

Size: 400 x 210 x 70 mm
Weight: 1.60 kg

TV Computer

This is Videoton's long promised and recently launched microcomputer in two memory sizes. This machine was hitherto completely unknown to us and we were pleasantly surprised. With many colorful handy graphic functions and many hook-up possibilities.

Size: 460 x 190 x 110 mm
Weight: 2.80 kg (feeder unit 0.80 kg extra)

Pro-Primo

A machine developed by MTA SzTAKI, an advanced version of the well known PRIMO, with color screen, regular button keyboard and small program enhancements.

Sixe: 55 x 260 x 310 mm
Weight: 0.90 kg

Microdat

This machine was developed by Microdat 6MK and would be manufactured by the DATACOOP small cooperative, and is based on the Apple II's license. It is, indeed, not in the same category as the other machines, as this is actually a personal computer, which can only be used with a floppy disk and, with respect to its operating system and other capabilities, is designed to meet greater requirements. Its correspondingly high price, on the other hand, is a disadvantage, which our inquisitors were not aware of, but suspected. Undoubtedly, it was a revolutionary machine in its time, but that time has passed.... Perhaps in our country too.

Size: 125 x 310 x 395 mm
Weight: 7.2 kg

Homelab 4

This is a machine put together by the lone wolf of our domestic computer design, Jozsef Lukacs, based on his long years of experience, which is already being serially produced by the Dombovar Producer Cooperative. Its far removed predecessor was the almost forgotten AIRCOMP. Alas, the mechanical execution of the machine still bears the typical faults of all "producer cooperative products."

Size: 345 x 230 x 65 mm
Weight: 1.35 kg without the feeder unit)

Results of the Inquisition of the Computers in the Competition

1 February 1986

	Tortures:	HT 3080C	Commodore 16	TV Computer	Pro-Primo	Microdat	Homelab 4
1)	Keyboard	4.6	3.9	4.3	3.3	3.4	2.4
2)	Accented characters	4.9	2.3	4.9	4.1	2.8	2.6
3)	Peripherals	2.6	3.5	4.7	3.7	4.6	3.6
4)	Screen handling	3.4	4.1	4.4	3.6	3.0	2.4
5)	Storage	3.0	2.7	4.9	3.0	-	-
6)	Program language of machine	4.3	4.6	3.8	3.7	2.9	4.4
7)	Character legibility	3.9	3.4	4.9	4.7	3.3	2.9
8)	Sound	-	4.4	4.1	3.6	2.0	3.2
9)	Editing functions	4.7	3.7	4.6	2.7	2.1	2.6
10)	Compactness	4.9	4.0	3.9	3.6	3.3	3.4
11)	Learnability	4.4	4.1	4.0	3.7	2.9	3.5
12)	User-friendliness	4.4	4.1	4.3	3.7	2.7	3.4
13)	Hardware documentation	2.3	4.1	4.1	3.5	2.1	4.1
14)	Machine code programming	3.4	4.1	2.7	2.8	3.4	4.0
15)	Compatibility	4.8	3.0	1.2	3.8	3.7	2.9
16)	Memory size	-	-	-	-	-	-
17)	Accompanying softwear	-	4.3	3.8	3.7	3.7	-
18)	Ability to use existing softwear	4.6	2.9	1.2	3.0	4.6	-
19)	Subjective opinion	4.3	3.4	4.4	3.5	2.7	2.3
Average		4.0	3.6	4.1	3.6	3.2	3.1
Weighted average		4.01	3.68	4.16	3.56	3.11	3.14

And What Happened Since Then? or Editorial Epilog

Quite some time has gone by since this inquisition. In the meantime the end results of the contest have been announced, according to which the adjudging committee recommended for the public primary schools the 48K version of TVC. The Commodore 16 (with expander) and the 16K version of the PRO-Primo. For the secondary schools, on the other hand, the 64K model of the PRO-PRIMO, the 64K variant of the TV Computer, and the HT 3080C were suggested. Recommendation means that the counties and schools, themselves, decide which computer they want to buy with the moneys at their disposal. The theory is quite proper and laudable. To offer guidance on the basis of expert opinion and to leave them freedom of choice.

However, the fact of the matter is that in this particular instance the option theory acts as a hindrance to an increase in the number of operational computers. What happens is that everybody is waiting for the C16's. To be sure, it is evident that it is not possible to import as many C16's as there is money available, but everybody believes that it is foolish to spend a red nickel before the results are in. Why shouldn't we be the lucky ones? That is what they are thinking in the counties and the schools. There is much excitement, especially since it has become known that Novotrade is offering a "bonus": they will deliver the machines at an unchanged price, but expanded to 64K. Sure enough, but in the meantime difficulties have arisen in connection with the import of the C16's. The financial mills, too, seem to be grinding slowly, especially when it comes to an important hard currency amount, but in addition it turned out that there are simply no more C16's around. Commodore has discontinued making them. According to our best informed sources it is possible that by this coming fall, instead of the 16's, the by-far better +4's will become available and it will be the latter they will deliver to the schools at the C16's prices. But when this information leaked out, it caused even higher hopes throughout the country and put an even deeper freeze on the moneys. The two domestic winners, COSY, which manages PRIMO, and VIDEOTON, are helplessly waiting for non-existent orders. They do not know what to do, should they or should they not buy large quantities of components which, as we know, cannot be done from one day to the next. In the meantime Videoton has started a book series in support of its machine and is busy developing hardware, while PRIMO is making great promises: rumor has it they have recently been "building" a screen editor into their machine, they are also whispering something about a parallel printer interface and about all sorts of intelligent softwear. And the orders are still late in coming. A stalemate is what we would call it in chess. And looking at the situation realistically, this stalemate will not change within the next few months. All we can do is sit and wait for his Highness, the Commodore, to deign to come trundling into the Keleti Railway Station. And until then....

12759/12795
CSO: 2502/52

BULGARIAN LASER, SENSOR DEVELOPMENTS OUTLINED

Sofia VECHERNI NOVINI in Bulgarian 11 Jul 86 p 6

[Article by Nadezhda Chakurova: "A Bulgarian Laser and Three Other Products"]

[Text] A discussion with Academician Milko Borisov, director of the Institute of Solid State Physics of the Bulgarian Academy of Sciences, yielded the following information.

Many times over the years we have spoken with the director of the institute, Academician Borisov, and we have always brought away in our notebook, or on tape, a record of new research and new developments, some of which have already made their way into production. And now achievements have been made which are of decisive importance in scientific and technical progress, some of which have been embodied in production prototypes. They are still waiting for someone in the capital to manufacture them, not only because the institute is situated in Sofia, but above all because there are plants and associations in the city which should be interested in applying the new developments in industry.

Academician Borisov announced that he had four items to discuss. They have a direct bearing both on acceleration of scientific and technical progress and on the specific nature of our city. All that is needed is greater understanding by the party and state leadership. These new items are on the leading edge of contemporary trends in electronics and optics now emerging in Sofia.

Copper Bromide Vapor Laser

This is an original Bulgarian invention based on four inventor's certificates and a number of scientific publications. It has been patented in the USSR, GDR, United States, FRG, England, Japan, France, and Australia. It has no counterpart elsewhere in the world. It is less costly and more durable than the copper vapor laser. The new Bulgarian laser has a service life longer than 1000 hours. The scientific paper on this laser presented by scientific associate Nikola Subotinov attracted great interest at the national conference recently held in San Francisco in the United States. The Laser Corporation in the United States has proposed production of the laser as a joint venture.

What functions does the Bulgarian laser perform? This laser is becoming increasingly versatile, but we will cite only its most important uses: laser detection, ranging, and navigation, underwater research, and bathymetry or echo sounding (that is, determination of ocean floor relief). It is used in medicine for cancer phototherapy, in surgery, in ultra high-speed photography of rapid processes, in photochemistry, in a laser projection microscope with potential applications in microelectronics, and in biology and biotechnologies. The institute has the capability of developing an entire assortment of such lasers.

Powerful Pulsed Laser Systems

Such systems are being developed jointly with the Institute of Electroscopy of the Academy of Sciences of the USSR. They are unique laser systems generating periodic ultra high-speed (picosecond) powerful light pulses. They exhibit a selective behavior toward different biological molecules and fairly complex biological objects. They thus allow the synthesis of mutant strains for biotechnologies and vaccines. They are also needed for new basic research in molecular biology. Such laser systems permit the building of new instrumentation for analysis of trace contaminants of 10^{-10} to 10^{-12} percent of a chemical element.

An Original Type of pH-meter Sensor

The term "pH" is used in chemistry for definition of acidity in any chemical process. The new microelectrometer technologies allow the development of a new type of sensor for this basic value.

The Bulgarian instrument differs from pH-meters with glass electrodes in being miniaturized (its silicon chip measures 2 x 3 millimeters), its high speed of operation (0.01 second), and its extensive potential for automation and computerization of measurements and simplification of electronic components, along with its high mechanical stability and versatility, to say nothing of its low cost.

New Acoustoelectronic Elements and Instruments

The Electronic Transducer Plant in Sofia is currently developing production of acoustoelectronic elements for frequency control and selection. These elements can also be used as sensors of various physical quantities. Highly sensitive and highly accurate piezoresonance thermometers have been developed. Piezoresonance moisture and pressure sensors are to be developed next. They will be used as new components of equipment in meteorological and geophysical research, and also in a number of chemical and biotechnological processes and production techniques.

Instruments employing surface acoustic waves have also been developed at the institute. A paper on ulta high-frequency and high-stability surface acoustic wave generators was presented at the first international symposium on surface waves recently held in Novosibirsk; it aroused considerable interest. These generators will be applied in various areas of communications and measurement engineering.

Production Divisions must be Established

"I believe the first step toward practical application is a production division for the institute," we were told by the director. "I am convinced that, if the party and state leaders in the capital will enable us to outfit such divisions with modern equipment and with the necessary premises and personnel, our scientific associates will be able to start up pilot-scale production of these new developments. Later, as the market expands, small enterprises might even be established, or production could be expanded at plants in Sofia whose production is the most directly related to our interests and scientific research."

The forms of application of scientific achievements vary just as widely as does the specific nature of scientific application projects. In our case, production divisions at a scientific institute may prove to the the most practical if their establishment succeeds in curtailing the cycle of research, application, and production. Any scientific project is important which holds forth promise of future high efficiency and of rapid achievement and acceleration of scientific and technical progress.

6115
CSO: 2202/27

YUGOSLAV SPECIALIST DISCUSSES MICROELECTRONICS DEVELOPMENT

Zagreb START in Serbo-Croatian 26 Jul 86 pp 30-33

[Interview with Prof Petar Biljanovic, director of the Electronics Institute of the School of Electrical Engineering at Zagreb University, by Stanko Stoiljkovic: "Petar Biljanovic's Electronic Discovery"; date and place not given; first paragraph is START introduction]

[Text] Prof Petar Biljanovic, age 49, is director of the Electronics Institute of the School of Electrical Engineering at Zagreb University. He suddenly drew public attention when he published a study entitled "Stanje i razvoj mikroelektronike u Jugoslaviji" [The Status and Development of Microelectronics in Yugoslavia], a document that is very interesting and inspired, but also has critical intonations. The subject of our interview headed the group of scientists which prepared that study on behalf of ETAN [Association for Electronics, Telecommunications, Automation, and Nuclear Science].

The slender face of a monk is framed in a carefully trimmed beard going gray. As he speaks, it is as though he puts all his energy in every word, although his voice is quiet, all but inaudible. The athletic external appearance attests to a vigorous man who knows how to put his views across and defend them. We might say that this is a sketch, physically, of course, of Dr Petar Biljanovic, professor and one of our top experts in microelectronics. To judge his spirit would take much more time than the 5 hours we spent in pleasant conversation.

The public learned of that study, and this incidentally is a rarity when it comes to professional findings, following the harsh words uttered by none other than Prof Petar Biljanovic. That is, everyone was a bit surprised when he said (the great truth) that we have no future unless we invest in high technology, in microelectronics above all.

"In a high technology such as microelectronics science is truly the driving force behind development; that is not just rhetoric at all," he said. "It furnishes the recipe for microelectronics. In Western Europe, the United States, and Japan very large investments are being made in scientific research in the field of microelectronics. I am in a position to know what is being done throughout the world, that is, even in the less developed countries. I say that microelectronics is a field into which almost all countries have

entered regardless of their level of development; both the rich North and the poor South have become interested in it. No one has remained aloof. Even certain countries at a low level of development have become involved, since of all resources microelectronics requires only whatever brain power you have. And you will acknowledge that that is available everywhere. The problem in our country is that we have done a relatively good job of developing conventional industry--metallurgy, machinebuilding, the electrical equipment industry, and so on--but they all require a great deal of energy and raw materials, but little knowledge and science. And they also require quite a bit of manual labor. In the case of microelectronics and the other high technologies relatively little energy and raw materials are consumed, and rather the basic condition of their development is knowledge. Unfortunately, we do not have as much of that as is required for the accelerated development of those technologies."

START: At the heart of microelectronics is what is virtually a magic wand: the chip. What is its role, what has it done so far to change things so much?

Biljanovic: The first chip was made in 1960. This was a tiny silicon crystal containing a dozen or so transistors and resistors, and it performed a simple logical function. Since then more and more electronic components have been "packed" on the chip: 1,000, 10,000, 100,000, soon it will be 1 million (perhaps such a chip is now being tested in some laboratory). It is difficult to forecast the limit on that complexity--although specialists are trying to compute how many transistors can be accommodated on one chip--simply because even today a certain state of saturation and applications is occurring. That is, this technology offers more than there are applications for its capabilities. Incidentally, the theoretical limits do exist. This chip has the virtue that it can be manufactured in highly automatic plants, in extremely large production runs, and at a price which is very, very low for the customer--in view of what is being offered him. I have tried to calculate the knowledge on one chip, since its price is actually the price of that built-in knowledge. Even the largest and most complex chips have less than 1 gram of silicon. If you make the comparison, a chip is 10 times more expensive gram for gram than gold. The value of the raw material it contains is almost equal to zero, what costs is the knowledge. And that chip, so scant in the materials it contains, has an immense capacity to work with information (it processes an immense amount of data in a very short time). The chip installs memory in all products, and since it is tiny, it essentially reduces their size, while at the same time considerably augmenting their functions. Present-day airplanes, for example, would not be able to carry all that electronics, they would not be able to take off if it were not for small chips. Which is not to mention the computers that would not exist without chips.

START: Under the impact of that tiny crystal of silicon the advanced world has been involved in a vast restructuring of its economy: it is relying on information instead of energy and raw materials. What does this mean?

Biljanovic: You often hear people speak about comparative advantages. Today in my opinion specialists are the only comparative resource, and I would, of course, include knowledge and science here. At one time those who had raw

materials and energy were the rich ones, today it is those who have the knowledge who are rich. Today you are no longer rich because of what you possess, but rather because of what you know, since whoever has knowledge will have possessions. The price of knowledge has been rising steadily. We learned in school that we have abundant energy and raw materials, and then they told us that we did not. I do not think that this is a handicap, since wealth means specialists. Unfortunately, we do not have specialists in the high technologies; we have them only for the conventional technologies. But we have an educational system which with changes and with larger investments could be "producing" such people. That is where we must start, with specialists and science. Those who are highly developed long ago realized this, since this is the commodity for which there is the highest demand. The best example is Japan. In the fifties and sixties we were better than they were. They realized that they did not have energy and raw materials, so they invested in people. Much the same is true of the countries of the so-called sunbelt and southern Asia.

START: It is said that there can be no progress without the high technologies. What impact do they have on production relations and social relations?

Biljanovic: I would say that that is a rather benevolent observation. I think that there is no survival without the high technologies. Unless we introduce robots into the automotive industry, we will not make our way on the world market. Microelectronics is a part of the wave of high technologies. Those are the technologies for which scientific information is the basic and most essential resource, which are capital-intensive and consume little energy and raw materials either in their production or in their operation. And, equally important: as a rule they are clean, they do not pollute the environment anywhere near as much as conventional technologies. Those conditions are today met most closely by microelectronics, optoelectronics, robotics, genetic engineering, and the development of new materials. These are the basic technologies on which the application technologies are based. For example, telecommunications, telematics, CAD/CAM, and so on, are springing up out of microelectronics. They will at the same time bring about a renascence of all the conventional industries. I think that the high technologies are like the ticket you need to get into the 21st century; that might sound like a slogan, but it is a fact that today everyone is buying that ticket.

START: One gets the impression that the new technologies mark a dividing line in history such as the world has not previously known. Will the societies of the future be divided--as some have predicted--into the postindustrial societies and those who have been left at the threshold of the third technological revolution?

Biljanovic: That danger is a very real one. Over the last 10 years or so we have seen that it is the technological factor that determines the overall development of society, and this has been realized by the entire world, especially the advanced countries. If you look at the development plans of certain countries or groups of countries, then ultimately it all comes down to technology, and this is a natural thing. The development of technology and thereby of high technologies has a direct impact on all the forms of

production, consumption, trade, and education, and when we look at all this, we see that the development of any society is founded on the development of technology. There is a certain fear of technological development, since supposedly more and more people would be left without work. We have to be aware that every society must develop. Every new technological leap has left certain occupations unemployed. That has always been the case. Computers and robots, however, open up job vacancies in the information and service sectors. Which brings us to the question of continuing education: a man must be prepared to change his occupation several times during his life, perhaps even within the same discipline. And that is why one must always invest in education. The countries which have achieved the highest development of microelectronics and informatics have created the most new jobs. Those are the facts concerning the United States, Japan, and certain other countries. It is no accident that the most highly advanced countries, because of the "constant hunger for specialists," have been importing them from the developing countries.

START: The Japanese even have a "project for production without workers." What is that about?

Biljanovic: That project envisages complete automation of industrial production, from which the so-called subjective factor would be eliminated (fatigue, lack of interest, private problems, disease). Quality is constant in an automatic production operation, it depends only on the design. At the same time, in automated production there is no risk of work accidents, and even in human terms it is better not to spend an entire working life (40 years) at the same machine. There are things which have been dogmatically postulated in our country: we have been relying on factory workers as the working class. But the definition of labor is more important, and that means that the worker is anyone who takes part in the production process. There will be less and less work done in production proper, and more and more in service activities, education, science, and so on. Factories without people, in my opinion, are inevitable in the near future; whoever has them will conquer the world market and will have better-quality goods. When we have automated production, you will be able to change the type of product and the production program in a very short time, and you will not have the startup period you have with conventional production. Volkswagen, for example, achieved top quality immediately by introducing robots, it did not take months to build it up. And there are an abundance of such examples.

START: You said in an interview with KOMUNIST: "Unless we become involved in the microelectronics revolution in a planned and organized way, we will find ourselves in the situation we were in in 1950." What were you referring to?

Biljanovic: I meant that as a society we would move seriously backward, not in relative terms, compared to others, but in absolute terms. We will actually get in a situation which perhaps might not be like 1950, but rather 1960 or 1945. I cannot predict it now, but I will say why we will go backward in both relative and absolute terms. First of all because we have a highly developed heavy industry, a conventional industry, but one which cannot market its products abroad, since it does not have high technologies within it

(microelectronics and computers). Today when someone in the advanced countries invests in a conventional industry, he invests in high technologies which improve that conventional industry. If we do not have high technologies, we cannot convert conventional industry to electronics, we cannot modernize it, and that means that we are not competitive on the world market, since we are offering goods of lower quality, but more expensive. The market for high technologies is the one that is growing the fastest: between 1960 and the year 2000 it will in commercial terms be the strongest, stronger than the automobile market, machinebuilding, or others. If we do not invest in high technologies, then, we will not take part in the most important segment of the world market, in the most important part of the division of the "world pie." That is why I say: if we do not get into the high technologies, we will lose our place on the world market! And we will also be losing it for conventional products, since we are implementing quite a bit of high technology in them. The question is whether we can keep up with agriculture and tourism, since high technologies are also affecting them (for example: genetic engineering in agriculture). This is the main problem, and it does not seem to have been taken note of in our society. I am an optimist, since I think that the number of people who realize this is increasing, but nevertheless slowly. It is most important that there be as many of them as possible in the sphere of decisionmaking.

START: What is the situation in microelectronics in the world at large--where is it most highly developed, and where is it not, what is being done in this area?

Biljanovic: The United States is in the lead; in fact it actually created this sector: Silicon Valley, with its factories and universities, is the leading area for microelectronics in the world, and that will be the case for a long time yet. The state of the art in microelectronics is development of chips on the order of magnitude of 1 million transistors on just one silicon board, which is actually a copying of entire electronic circuits. What once took up an entire floor of a building now fits on just one board. And then new materials are being researched. Gallium arsenide affords faster information processing than silicon, and then there are also new materials which cannot exist in nature, which are still better. And this is the principal preoccupation of the leading laboratories. If we look at other advanced countries, Japan is not investing nearly as much in the development of new technologies, and indeed it is even lagging behind Western Europe. But it is excellent at copying and mastering other people's advances, which contains a very important lesson for us.

START: What are the chances that small countries could become involved in the production of microelectronics, in view of the fact that large investments are necessary?

Biljanovic: The chances of the small countries are very good because energy and raw materials are not necessary, but only knowledge. There is intelligence everywhere, but to get results you have to be organized. We have people in this field who are among the best in the world; it might even be said that some of them are leading figures. Accordingly, we need only provide the

conditions. And small countries do make large investments. For example, I am one of the opponents of making a decision in this way to build four nuclear power plants. I am not opposed a priori, but this is an investment of $10-15 billion. We asked for slightly more than $1.5 billion over an 8-year period for microelectronics, and a portion of the investment would be repaid immediately, by contrast with the nuclear power plants, where there is a wait of 10 years or so before power begins to be generated. There are phases in microelectronics, for example, the production of polysilicon, which can immediately be sold on the world market. The investment, then, would be immediately paid off. Many have said that this is a lot of money. But we are not investing only in microelectronics, but in restructuring the entire economy, and that, you will admit, is very important. Microelectronics has infrastructural significance to the entire economy. But it is not spectacular, it does not require large facilities which someone will open by cutting a ribbon. In this industry there is little to see from the outside, but there is a very great impact when it goes into operation. If we have $10-15 billion for nuclear power plants, I do not know why we would not have slightly more than $1.5 billion for microelectronics in view of the fact that it has more to offer than nuclear energy: automation of processes, better utilization of raw materials and energy. There is a datum that bodes very ill for our country to the effect that our energy consumption is growing rapidly per unit of the social product, while the advanced countries are cutting back consumption; that is, they have technologies which are not based on the consumption of energy, but of knowledge. A certain number of the small and medium-developed countries have programs for the development of microelectronics, including all those surrounding Yugoslavia, except, of course, Albania. And everywhere those programs are being carried out with government support. Investment in microelectronics, that is to say, does not pay off solely through its products, but through complete industrial production, which today depends highly on microelectronics. We have a slogan: It does not pay to manufacture chips, since they represent only 10-15 percent of the price of equipment. And I say that this is precisely an argument for domestic production, since then you sell that chip at 10 times the price when it is installed in some equipment. That is, you also sell the material at a higher price. It should certainly be said that investments in microelectronics cover investments in industry, education, and science, by contrast with the financing of conventional industries.

START: What has been the treatment of the high technologies in our country; why are we lagging behind the advanced world?

Biljanovic: It has been very bad. They are only mentioned here and there in our documents on development, more to be stylish, but it is my impression that many who talk about them have no idea what they signify and are not ready to do anything to apply them. For instance, we do not have a single document that would establish what the technologies are, what their specific features are, and that would regulate anything whatsoever in connection with their development. We have not as a society made a decision to restructure the economy to accommodate the high technologies. And that is why investments are not supported in this area as they are in certain conventional industries. Our investments are by and large confined to SOUR's, with token help from outside. The several points at which high technologies are developing are not, however,

that we have taken a serious approach to them. The manufacturing of chips, for example, makes real sense if it is part of manufacturing telecommunication equipment, computers, and so on; that is, if it is part of a vertical technological chain. If you do not market the chip on the world market as a part of some equipment, then you cannot even talk about microelectronics.

START: You say in the study that the pace of a society's development is determined by the rate of development of microelectronics. This is an unusual definition, to say the least.

Biljanovic: There is a datum on the growth of the national income of various countries. The diagram shows a very close correlation between the development of high technologies and the growth of the national income: whoever has invested more in them has had a higher growth of the national income. Yugoslavia shows up poorly on such a table, it had a better place in 1968 than it does today. It cannot be said that the development of high technologies is solely "responsible" for the growth of the national income, but it is to the greatest degree. I am not inclined to say that if we buy 50,000 computers we will become an informatic society. We must first of all apply those computers at the right place, and we must, of course, have people who can use them. Countries which have not developed the high technologies are stagnating, and they will stagnate more and more. Actually, many countries have started out on the road of high technology: at certain party congresses in the East European countries the high technologies have been put in the foreground as a kind of new motto. I see them as a precondition for this society's survival.

START: Economic analyses show that the introduction of microelectronics, computers, robots, and automation would increase economic benefits ninefold. Is that true?

Biljanovic: We obtained that computation from our colleagues concerned with the economic consequences of the development of microelectronics, and we referred to it in our study. Of course, this is a rough figure obtained by analyzing the various sectors of industrial production. Robotization has the largest share in all of this. In any case, there is a very clear exponential growth of application of new technologies in production plants. New things are being applied today very rapidly and on a very large scale. For instance, I think that in 10 years or so the number of robots will be many times greater in industry than it is today, and you know what kind of impact they will have then. That is, it is well known that robots work continuously, they do not get sick, they always achieve the same top quality, they do not take a break, they do not go off on vacation, they do not require contributions for social welfare, and they do not have to be constantly educated. What is more, there are a number of manufacturing operations in which they are more precise than human beings.

START: Let us go back a bit: How did the study "Status and Development of Microelectronics in the SFRY" come about?

Biljanovic: It all started with MIPRO, which is short for microprocessors, but this actually refers to the annual meeting of specialists in microelectronics from the entire country, which traditionally has been held every May in

Opatija. It brings together those doing research, those manufacturing microelectronic circuits, and those who are using them. No one commissioned the study: It might be said that it is a kind of vox electronicea of this country. The idea came from Rajko Tomovic, member of the academy and distinguished member of ETAN on the basis of several meaningful discussions conducted in the MIPRO meetings. It might be said that the document is a crystallization of the opinions, views, and positions expressed in the Opatija meetings. The Economic Chamber took over the sponsorship, and its task, as we conceived it, was to get the study carried over into plans. It was not our aim for it to reach some forum to be adopted as a declaration, but to be put into practice as soon as possible so that it could be used to get certain action going. We did not want it to be one of a number of pieces of paper which are adopted in this country, but not applied.

START: What did you learn?

Biljanovic: Quite a bit. I will attempt to summarize briefly. I think that there are quite a few specialists ready to support the development of microelectronics, those who have realized that our society cannot progress without microelectronics. In Yugoslavia, and this is well known, we have a fragmented science and a fragmented production. Microelectronics is as though made to order to integrate them. There are examples of this everywhere in the world. Since in the end there is after all an urgent need for a great deal of money, and since equipment for it is very expensive, we have to bring together both the money and the specialists at the national level. We have to have a joint program, since the field of this technology is a highly varied one, and the key points need to be covered. That is why we must have the whole country available to us, both in physical terms and in terms of personnel. Along with all that, we will have to buy licenses, but not so that we would obtain certain products, but so that we would master a certain technology, which we would later improve. It is with those products that we would go on to the world market. I feel that we should complete the triangle consisting of science, education, and production--which does not exist today. We see only the tips of that triangle, but each tip is isolated, all to itself, it is not connected to the others. Every investment in microelectronics, as we see it, must also contain a portion for education and a portion for science. If that is to achieved, we have to grant education to meet the needs of high technology and the science which is working on high technology (and for high technology) the status granted to production, and not to proclaim them, as has been the case up to now, as consumption! Their growth should not be restricted, but stimulated. But, of course, this is not to say that we should look upon all science and all education as production. That science which is not made to serve technological progress may not have the status of production. And finally we should think about the education of our people abroad for the high technologies. We have a number of scholarships, our people are going to the United States, Japan, and Western Europe, but most of them are not working at the points where they will be when they return to the country. We must also say this: wherever there is microelectronics or any of the other high technologies, there has been a strongly evident influence of the government on the financing and development of these technologies. The government need not have the money, but someone has to provide the guidance, to encourage the

investments (with economic and other measures). Many countries have exempted from taxes those who have invested in high technologies.

START: One of the essential observations contained in that document is that microelectronics in Yugoslavia is in swaddling clothes. Why?

Biljanovic: If you look at microelectronic production, you will see that we have four or five factories which could be said to be engaged in microelectronics. Regardless of them, I say that we do not have microelectronic production in Yugoslavia, since those factories sprang up virtually spontaneously, they are not part of a unified technological system. For example, the producers of telecommunications equipment are installing many chips, but very few or no domestic ones. They purchase them from their licensing partners abroad, since they are not technologically mature enough to order chips from domestic producers. We do not, then, have that vertical technological chain that links together the producers of components with those who manufacture the equipment, and without that linkage there can be neither domestic microelectronics, nor computers, nor telecommunications equipment, nor robots. There is evidence at every step: look at any "domestic" computer. Whose components are inside?

START: You say that in the sixties we were closer to the microelectronics of the advanced countries than today?

Biljanovic: We were closer because microelectronics in the world was in the initial phase, and in our country the specialists in the institutes and at the universities had been curious enough to attempt to create something. At that time it could have been done without large investments. It might be said that in those years we were keeping pace with the world. After that instead of 10 transistors, they crammed 10,000 transistors on a chip, and that could no longer be done by the "handicraft" method; it was necessary to involve laboratories, to invest a great deal of money, to create an organization. And we, of course, dropped out of the race.

START: You favor the Yugoslav (not the centralistic) approach in the development of microelectronics. What does that mean?

Biljanovic: At the federal level there is not a single body which at that moment could draw up a program for the development of microelectronics and electronics and impose it on Yugoslavia by the force of argument and by its quality. At certain points, however, we do have people who could draft such a program, and ultimately we have offered it in this study. Now at the national level, perhaps in the new Committee for Science and Technology, this should be turned into a program which will be accepted by all, and the study could be a good basis for the development of microelectronics.

START: The investments and the research in microelectronics itself contains some unifying component....

Biljanovic: That is what is important. This is a technology (and equipment) which unifies regardless of where the plants are located.

START: You have proposed certain steps. Could you state briefly what they are?

Biljanovic: Total investments in microelectronics are estimated at $1.737 billion, and that figure would include semiconductor technology (production of chips), hybrid technology (the components are manufactured in what is referred to as the thin-layer and thick-layer technology), the infrastructure for both, equipment at universities, and the scientific macroproject at the level of Yugoslavia. All of that is brought together--production, education, and science, and it is done in 8 years. Then steps should be taken to stimulate the processes of vertical integration in the electronics industry and technology--from materials, assemblies, devices, major pieces of equipment, electronics for the general consumer, all the way to the ultimate users, and they would be the large systems (PTT, the Yugoslav railroads, the electric power industry, and so on). The vertical integration which is spoken about a great deal in the study is not organizational integration, it is technological. We also propose the formation of a federal body that would monitor development of microelectronics and high technologies and would adopt incentive measures, that centers for high technology and microelectronics be established at the universities, and that laboratories be opened for basic and application microelectronics. And, of course, initiation of the Yugoslav macroproject "Microelectronic Technology," with a council at the Yugoslav level whose work would replace the institute for microelectronics that does not exist. That institute would de facto exist in order to work, not to exist as an institution, and it could be automatically copied in any region of our country. This entire conception is in any case oriented toward production for the world market, since microelectronics is a global technology which does not tolerate regional exclusiveness, and those exports must cover everything--from chips to equipment--and it must be also directed toward the development countries which do not have microelectronics. We want microelectronics to be a part of the conception of development of the high technologies and we want that document to be adopted for the whole country. We are against setting microelectronics apart, since it is urgently necessary for all high technologies.

START: How are you going to get all that money?

Biljanovic: Easy, if we commit money from the large systems, that is, from the users of microelectronics. Yugoslavia is investing immense amounts to purchase equipment abroad, and it is mentioned that in the several years before the stabilization about $13 billion were spent to import technology. A few billion of that went for microelectronics. We have said in the study that we are making very large investments in research in microelectronics, but not in Yugoslavia, but in other countries! That is why we must find ways of redirecting all that money into domestic development. We would set up this kind of stipulation: whoever purchases a license must share in financing domestic development. The license must be the ticket one buys to gain entry to a new technology, and then one should go further.

START: We are now in a crisis, and that is after all a lot of money.

Biljanovic: I think that that money can always be found. It is just a question of where it goes. The answer to that question lies in the strategy

governing our technological development. I for one do not believe that anyone burned up the money or threw it in the Sava River. It simply has to be redirected. The reactions of those who have read the study are interesting. Some people say: that is a lot of money; other people say that it is not. But the strength of the chip lies in its infrastructure, and if we look at all the things it influences--then it is a very acceptable figure. And if one bears in mind the consequences.

START: Those are investments intended only for development and research, not for production as well?

Biljanovic: Production is included here in the investments for equipment, that is, investments in factory equipment. That would even include the infrastructure: for example, the access roads to some plant. These, then, are all the investments for 8 years. When the individual phases of this program go into operation, it will begin to pay off. And in future it will be financed from its own generation of capital.

START: You have put science and education at the very center, and you say that without them there is no development of microelectronics. What is the situation here?

Biljanovic: I have to take a critical attitude toward science and education. There are university departments and courses of study in microelectronics, and indeed entire university schools, not only in the advanced countries, but also in countries of a level of development similar to ours. We do not have courses of study in this field; we do not have any departments concerned with microelectronics within the study of electronics. Our universities did not see the importance of microelectronics in good time so that they might have educated people who would manufacture it and use it. That is why microelectronics is slow to make inroads in our economy. At the same time scientific institutes in the initial phase of development of microelectronics have undertaken very good projects: in 1968 a chip of professional quality was made in Yugoslavia for the first time under laboratory conditions. Later the institutes did not have financial backing, so they dropped out of this field and have been following it from the sidelines. Of course, laboratories for microelectronics in which specialists would receive their advanced training need to be established at the universities. Since a great deal of money is needed for this, there has to be a change in the way education for the field of microelectronics is financed. These must be joint laboratories belonging to the universities, the factories, and the institutes. This is where science, the economy, and education must come together. All of this exists elsewhere in the world, we need only to copy it and adapt it to our conditions.

START: What do you expect: Do we have a chance?

Biljanovic: I have never been a professional optimist, nor will I even now take an optimistic view a priori. The study cannot be identified with me: all those who worked on it left their imprint. The role of a kind of "slave driver" fell to me. If I did not believe in what I am doing, I would have chosen something else. I think that time is working to the advantage of

microelectronics, and that is why I am an optimist, although at the moment there are several reasons to be pessimistic. If I were to make an evaluation on the basis of the situation today, then I would not be an optimist. But one feels a fresh wind coming. I feel that something needs to be changed even in human psychology. That is, very recently we have heard a very poisonous argument made against high technology and microelectronics: all of that is expensive, and we as a small country have nothing to look for there. However, many less developed countries are developing microelectronics, and they are having good results. The question is who is serving us up the psychology of a small country and why? I do not know whether Switzerland is a small country or on what basis this definition is made.

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CSO: 2802/2

APPLICATION OF MICROELECTRONICS IN CHEMICAL INDUSTRY

Prague TECHNICKY TYDENIK in Czech No 11, 11 Mar 86 p 6

[Article by Eng Antonin Mlcoch, candidate of sciences]

[Text] Electronics is applied in a wide assortment of machinery and consumer goods as an essential element replacing some functions based on mechanical principles with electronic ones. As a result of this trend the demand for material, energy, and labor in industrial production is decreased significantly. Today, it is not unusual, if modern electronics is introduced directly into competitive products and becomes an essential element, for our products, without such features, to quickly lose their value and market. Low mass, small dimensions, high speed and increasing reliability of electronic devices represent parameters without which a further development of modern industrial production is hardly conceivable.

The pace of development in electronics in recent years ranks among the fastest ones in our national economy. While our products of the electronics and automation industry face fairly complex problems related to production capacity, equipment and technology, qualified personnel, spare parts supply, service availability etc., the sectors which are "consumers" of electronic and automation technology lack the sufficient preparation for putting this new and complex technology into practice. The production sector very often faces principal electronic applications in a static way with little incentive of its own--it waits for somebody to deliver equipment for immediate use and to warrant its reliable operation. The necessary climate for realization of goals has not been formed in many institutions and incentive, aiming toward towards bold and pronounced changes with maximum application of the most modern electronics has not been stimulated, especially in production management personnel. One way to solve the problem with suppliers of applications for immediate use is the incentive developed by Chemoprojetkt Satalice which became in 1983 the leading center of technological development for application of microelectronics in the chemical industry. Workers in Satalice in a relatively short time concentrated research capacity and organizational endeavor towards the development and placement into production of a complex microcomputer system. The starting point was our series produced computer SAPI 1 (Tesla Liberec) supplemented by the resolution of specific technical requirements resulting from application of microcomputer technology in chemical processes.

The developmental and experimental work resulted in the completion of the first stage of development of the microcomputer which Chemoprojekt Satalice will use in application of microcomputers. Through the leading workplace it is also offered to other application workplaces. This offer also contains a relatively complex formation of technical devices, a certain number of system and application programs and complementary construction elements enabling the microcomputer system to be built in a stand or desk. The degree of complexity of the offered devices is at a level that will enable the workplaces to immediately proceed with the selected task without the usual time-consuming and expensive preparatory work.

The functional units supplied by Chemoprojekt are as follows:

--the microcomputer SAPI 1 from Tesla Liberec contains 6 functional units, while the Chemoprojekt expansion has 10 functional units intended mostly for connection of the microcomputer with the terminal system.

--Another expansion is under preparation, involving optical transfer systems suitable for industrial applications, a microcomputer communication unit, fast supplementary RAM memory, graphic display and other units.

The microcomputer system is designated as CHP 3000. In order to verify the technical parameters fo CHP 3000, Chemoprojekt developed 14 application programs this year aimed for control and evaluation of complex analytical processes in information and control systems.

From the applications placed in operation so far, we can mention emission monitoring in Chemopetrol, Severoceske zavody Lovosice, emission monitors for Prague, distribution of gas consumption in United Steel Plants, Kladno, a multiterminal system of dispatch control (e.g. in Interier Ricany), automatic analysis plant to control and measure the waste water and water streams (based on technical documentation, produced in Midrotechna Praha, Prague).

The achieved results confirm the appropriateness of the intention to use the microcomputer system CHP 3000 also in other workplaces, where the delivery term may vary from 6 months to 2 years, according to the complexity of the individual problem.

From the technical and programming point of view it would be possible to supplement the workplace in Chemoprojekt in Satalice by a computer other than the SAPI 1 on the condition that the customer will supply it for completion.

13197/12232
CSO: 2402/9

COMMENTARY ON NEW TECHNOLOGIES IN GDR, CEMA

Brussels DE RODE VAAN in Dutch 10-17 Apr 86 pp 15-18

[Article by Jan Vermeersch: "Chips in the GDR: A Computer on a Human Scale".]

[Text] Technology is often associated with the West. As if the East did not have any computers or the people there were less capable of inventing them. Still, there are noticeable differences. We flew to Berlin--to the German Democratic Republic, in other words--and talked there with scientists, engineers, and union officials. Technology, the new apple of discord between East and West, is also high on the agenda of the 11th Party Congress of the SED, which is being held from 17-21 April.

Computer Gap

4 March. Almost 10:00 in the practically empty bar of the International Press Center in Berlin. Dr. Strahmel, economist and the first person we have spoken with, looks up quickly, amused, scrutinizing, not at all surprised by your correspondent's question. Then, smiling slyly: "Chips from the FRG? Course we have them, but don't ask me how we get our hands on them. Any way we can, of course, and that's not a stable basis on which to build up your economy, that COCOM [Coordinating Committee] list. Some stuff you do get, other things you don't, and you can never be sure about anything. That's why this country has to develop its own technology, and we're doing very well at it too."

How many chips from the Federal Republic enter the country is probably one of the best kept secrets in the GDR. No details are provided. We know just as little as about intra-German trade in general--except that it has tripled in the last 15 years; you do not learn much in Berlin about numbers and categories of computers imported from the West. You do see them installed but there are no overall figures. Or at least we do not know of them.

That is partly due to the West of course. It is not the Russians or the East Germans who invented COCOM, and the list of "forbidden products" is a (300 page) long one. Today technology is one of the areas in which the rivalry between East and West is being fought out. Information is scarce and the trade arrangements far from transparent. In the Pégard affair here we were able to see how elastic the COCOM lists are and the GDR has already had a whole series of Pégard affairs with the Federal Republic.

The GDR was and is behind technologically; just like all the other socialist countries for that matter. Almost none of the people we talked to tried to deny that; they emphasized the COCOM restrictions, currency restrictions--technology is expensive--and the delays of always "having to reinvent the wheel." The computer gap between East and West does exist then. People who are in a position to know estimate the East as being 3-15 years behind. However, these same sources make it clear that the GDR is very successful in the microelectronics industry. Of all the East European countries--with the exception of the Soviet Union of course--the GDR is said to be the most advanced and to be supplying important parts for the USSR's space technology, for instance.

It is difficult to assess the level of GDR technology. If you inquire at the Academy of Sciences, they confirm that the GDR is one of the few East European countries that have mastered the basics of microelectronics but that this does not mean that applications are already being produced in as large quantities as in the West. That is what we will hear more than once: qualitatively they have nothing to be ashamed of, but quantitatively they are governed by different imperatives. Toward the end of 1986, 500 computer-managed working centers are to have been installed, according to the Law on the Economic Plan for 1986. And by the same date, as part of socialist rationalization, 17,500 office and personal computers, 125 large EDP installations, and 330 small computers are to have been built.

However, just where does the GDR stand technologically in Europe? On the level of Great Britain, Italy, the Netherlands? The people we talked to would not make any comparisons. They pointed out that research has developed unevenly in the various countries--which is true; they cited growth rates that are among the best in the world (optical-electronic construction elements: +29 percent in 1985; monolithic integrated circuits: +34 percent); and in particular they never tired of mentioning the extremely sophisticated optical equipment supplied for Soviet space research. The GDR has not missed the new technologies train, is the message. "But we were one of the last ones to jump on," jokes Dr. Peter Strähmel of the Academy of Sciences, and "we could for instance make very good use of a 100 percent growth rate."

Gift from the Gods

Party leader Erich Honecker is supposed to have said once that his country cannot be average and get by. The GDR has to do better than other countries. Its very existence is still called into question by some parties and there has always been the pressure to prove the economic viability of the "other Germany." Life in the GDR is still permeated by these realities. The regime cannot get along without its peptalks. On the TV news you have to listen to them reading economic statistics for minutes at a time--egg production: +5 percent; cattle breeding: +8 percent; etc.--and wherever you go, you are inundated with figures, tables, graphs, and percentages.

So too with the new technologies. You might say that the GDR is astonishingly ambitious in this area and they do little to conceal it. In the Pay and Labor Section of the FDGB Federal Executive (unions) in Berlin, Horst Lehman says, "We will not stay behind. If we want to be one of the 10 leading industrial countries in the world, we have to get on the path of scientific-technological progress and have to have fully automatic operations here too. That doesn't have to make anybody unemployed, as you well know. Everything goes according to plan, step by step, respecting the workers' social wishes. Our microelectronics are not in the store windows as they are in your country, but they do exist; and some Western industrial countries haven't even reached the level of the GDR."

There are several important reasons why the GDR is so very eager to gain a foothold in the list of leading European industrial countries. One of them, for instance, has to do with the structure of the GDR's foreign trade. The GDR can still be considered as the Soviet Union's leading trading partner, but in addition it is no longer any secret that a large amount of GDR products is sold in the European Community via the Federal Republic. The GDR is a silent partner in the EEC, we are told once; but if it wants to maintain that position, then quick delivery times and quality products are of the highest importance. And that, of course, is where technology comes in.

Second--and this may sound strange at first--technology and a stable level of prosperity are closely connected. Certainly they are in the GDR. As we know, that country has had to struggle for years with a labor shortage and from this perspective the new technologies (NT's) are truly a gift from the gods. New technologies save labor but in contrast to the West, where the introduction is accompanied by unemployment and social disruption, in the GDR you see a different evolution. The NT's relax the

pressure on the labor market. Labor saved in industrial production processes can be transferred to the services sector, to offices, banks and other savings institutions, and the Post Office, where some departments are undermanned and customers often have to queue unnecessarily long.

In this respect too the GDR is an economy in transition. Except for a few places in Berlin there are no automatic teller machines, nor do they use bar codes in their department stores as we do, but they are busy on a tremendous scale introducing the computer and electronic data processing into the public services, health care, traffic, savings institutions, etc. The advantage of this system is that it is possible to profit from the different political and social relationships. Applications of new technologies can be applied more quickly on a large scale. Technical universities, research institutes, and firms work together to put their minds together and achieve maximum profitability, and it is not uncommon for several firms--joined together in the GDR in a few dozen large combines--to take advantage of a large central computer where technological data is stored. There is no such thing as a company secret in the GDR. And (East European) cooperation looks like an absolute must, given COCOM and other obstacles.

Dr. Ulrich Stegman, head of the Rationalization and Technology Section of VEB Werkzeugmaschinenkombinat "Herman Matern" Magdeburg (manufacturer of lathes): "Yes, we've been forced to work together, given the speed with which the NT's have been introduced here in the past few years and the way the things we produce have changed almost completely. Some of the parts we produce have to be worked very precisely, with extremely accurate (three-dimensional) measuring equipment that's run centrally from our computer room. Well, that calls for the closest possible cooperation between the people operating the machines, the people responsible for the technology, and the quality-control people. And, too, we don't want to be too very dependent on service and parts from the West. But that three-dimensional measuring equipment, you can't get it here and so we've had to import it from abroad."

"Abroad" means the other socialist countries, but mainly the West. In the central computer room--the heart of the factory, you might say--we see machines of British and American manufacture. Everything brand new, with precisely one man watching the screens and the forest of buttons. When we ask how much foreign technology there is in this factory, Stegman says rather hesitantly, "Probably about 20 percent."

New Consensus

That is a figure that we are to hear elsewhere too, usually after pressing a bit; but you have to try to figure out for yourself where the bulk of the foreign chips are to be found. Let me repeat, trade in technology is a delicate issue between East and West. The Americans understand that. At the present time more and more microelectronics goods are being put on the COCOM list, and even though the fact is that the tiny chips--precisely because they are so tiny--can be exported very quietly (high-tech smuggling, in other words), you cannot escape the impression that we are looking at a little economic war being fought, with the intention of holding down the level of prosperity of the socialist countries--in other words, to create a new gap.

That is not unimportant to the GDR. For many years leaders and people did not get along so well. It is only in the last 10-15 years that a consensus has grown up, that the economic accomplishments have been appreciated, and that the Federal Republic has ceased to seem a paradise in the eyes of many. The GDR has a high standard of living today. Higher than Great Britain, for instance, and that is not at all unrelated to Erich Honecker's more consumer-goods oriented policy. Today those who want to disrupt things have to think of something new, and what is more obvious than to rob the regime of what is likely to make life more pleasant and efficient?

Worry about the quality of life, in other words: that is what is at stake. The West is paying more and more attention to it, because of the crisis; and you also find that GDR officials boast of their accomplishments.

And they do have good results to boast of. However, people in the West do not like to hear that and in addition they fear the propaganda effects of a more planned approach to things. Of course if you look at things fairly, they will look different, even if you, like us, are not very attracted by the strict ideological straightjacket imposed on the citizens of the GDR.

That is a thought that will come to you more than once in the GDR: these people give it their very best--for that matter, they are friendlier and less arrogant than their neighbors to the west--but why in heaven's name does everything have to be covered with a heavy layer of ideology? Their economic planning is logic itself, their technology exists for the people (see below), but why do those same people have to have it spoonfed to them every day at 7:30 that these splendid results are the work of socialism and of themselves? As if they did not know that. It may well have to do with the fact that this state is still not considered to be full-fledged. But even so, people have doubts and ask about political democratization. Legitimately so? Certainly.

Technology--a subject for which it is easy to get readers in the West today--looked to us like an appropriate starting point to take a look at the East from a different point of view. No preconceived notions here, we thought. No subjects covered by unbreakable taboos, just take an inventory, put the engineers through their paces and ask businessmen about this blind spot in our knowledge. Technology touches on politics, that is clear from what we have said; but technology also touches people, the citizens of the GDR. And in a different way than in the West.

In particular, the introduction of the NT's leads you to social questions in the GDR much sooner than here at home. "You do sometimes see a tendency to emphasize the positive economic effects a bit too much," says union official Horst Lehman in Berlin, "but we're very far from ignoring the social consequences of the NT's. It's all a question of how you define progress, of course. If you broke the unity between the introduction of the NT's and this country's social policy, well, then it wouldn't be real progress any more. Couldn't sell it to our workers, for that matter. Different working arrangements have to be talked out in advance. Improving working conditions is a basic part of it, from the nature of the system itself. After all, aren't we distinguished from other socio-economic systems by the conditions in which producers have to work? Well then, in the GDR you can't introduce the NT's at just any speed, you first have to produce comprehensive arrangements for the workers whose jobs are threatened.

Above all, make this clear, we are told: nobody has to lose his or her job because of the introduction of the new technologies. That needs some clarification, but it is true on the main point of security and income guarantee. Nobody loses pay. You may have to look for another job (or at least they will get you one), you will have to work somewhere else (but usually in your own area or a related firm), and it may be that as an older worker you will not much like that, but you can be sure of one thing: you have your money. Whatever happens.

Shift System

During our stay we did not get a particularly good insight into the practical, human problems connected with the NT's. We assume that major (social) efforts are being made. There is the noticeable absence of any mythology connected with the NT's such as we produce here at home, and there is the fact that in some sectors and firms up to one fifth of the labor force is affected by the introduction of the NT's. They speak in this connection of "socialist rationalization." The NT's are part of this "rationalization"--in other words, the more economical use of people, tools, materials, and working time--and of the stiffening up of socialist competition.

What is new now is mainly the striving to make better use of the available machinery. Capacity is being optimized. The introdution of the NT's is coupled with the general introduction of the shift system, which is

supposed to make it possible to raise the country's industrial achievements to new heights. This will almost certainly tap new economic possibilities for the GDR. Developments in this regard are still uneven, vary from combine to combine and from region to region, but the trend is clear: labor is being saved everywhere and thus made available for new uses, preferably for use in a second and third shift. So far the third shift has not been introduced in many places, but the whole social apparatus is being prepared to stimulate that development.

In that case you would see an "integrated" approach to work, housing, and living. Not everybody will be enchanted by it, that is obvious. Some will feel that there are too few barriers between private and social life; and you are not obligated, but this country is organized around the work ethic and the sacrifices the state asks of people, "the first workers and farmers state in German history," as Erich Honecker puts it.

So it is all exquisitely organized and those who are willing to go along with the shift system enjoy all kinds of social and financial advantages in the form of a shift supplement to their pay, more leave, a cheaper vacation, and shorter hours (40 hours; the average working week in the GDR is 43 hours and 45 minutes). They are also taking into consideration the effects on people's family life. Husband and wife sometimes work the same shift. Solutions are being sought for child care and transportation, and they are trying out different, flexible hours for stores. Thus near the petrochemical plant in Schwedt you can go to the supermarket on Sunday afternoon.

Schwedt is a model by the way. Whenever people in the GDR talk about the results of scientific-technological progress, they immediately mention this firm. "Fewer produce more," the information booklet says. In Schwedt between 1978 and 1980, about 2,400 workers were "freed up" and between 1981 and 1985 it was another 820. Those are impressive numbers for a firm employing around 8,000 people, although it must be added that not all the workers went looking for other work, in or outside the firm, exclusively as the result of the introduction of the NT's.

In the Kombinat VEB Lokomotivbau "Hans Beimler" in Hennigsdorf, which we visited personally, we heard roughly the same story. The firm produces two locomotives a week, and since the machine tools have been run by computers, labor productivity has risen 300 percent. The technology is largely home-made, with export licences in various countries. Still, here too you find FRG technology and in parts of the firm they work on the shift system. If today they produce two locomotives a week, that is also partly due to that, and to socialist rationalization, they say. In engineer Peter Schmidt's section, 330 people (out of 2,300) have been affected in the past 2 years by rationalization. They got other work in the firm or sometimes outside it. There were no transfers to lower-paying jobs. And this firm too is bound by the obligation, as in all GDR combines, to produce at least five percent consumer goods.

It would not be going too far to say that certainly in this regard, in strengthening the consumer sector, the introduction of the NT's is important to the GDR. Socialism does not thrive in poverty. Old Karl Marx knew that, for was he not the one who said that the purpose of the economy is the optimal and maximum use of free time? More than one of the people we talked to smiled when we cited that. "We're not afraid of free time," said Dr. Peter Strähmel very quickly, "but, alas, we have to talk about the productive time first."

[Box, p 18]

J.V.: Technology and COMECON

Something specific led to this story: at the beginning of December there was an extraordinary session of COMECON--Council for Mutual Aid and Assistance, mainly made up of East European countries--at which they discussed technological integration up to the year 2000. The session was described as historic. Long-term programs were agreed on, particularly for microelectronics, automation, nuclear energy, new

materials, and biotechnology. These programs are supposed to enable the East European countries to catch up with the West technologically. A socialist variant of Eureka, in other words, and they did not deny that at the conference.

It is generally known that it was mainly the Soviet Union that pressed for this meeting. It was actually planned for this year but brought forward at Moscow's suggestion. It took place just a few weeks after the Eureka conference in Hanover, West Germany. That may well be why the West concluded rather hastily that technological panic had broken out in the East, but there may have been other reasons as well. Mikhail Gorbachev's interest in technology is well known. And the recognition that the new technologies boat must not be missed is not brand new.

This last point is also connected with the fact that economic cooperation among the Warsaw Pact countries is not nearly as flourishing as is thought in the West. That cooperation faces bureaucratic obstacles and is almost always subject to countless regulations. Scientific exchanges do take place, but concrete economic cooperation is difficult. If company A in Hungary wants to set up far-reaching industrial and technological cooperation with firm B in Czechoslovakia, there is always some fine print in the law that puts obstacles in the way. At least that is what we read a while ago in an article by Anna Sandor in the NRC HANDELSBLAD, and we have no reason to doubt the honesty of that journalist.

For the reasons just cited, some East European countries--the GDR, Hungary--prefer to do business with the West. That is never really said openly and cooperation within the bloc is still the main thing but we see certain tendencies. Almost half of all Hungarian computers (30,000) come from the West and that is also true of parts and service. Bulgaria, usually seen as a faithful ally of Moscow, is trying to build up a leading position in biotechnology through joint ventures with Western firms. And anybody who has seen the GDR's unfeigned interest in Eureka will have to conclude that that country too has one eye on the West.

However, there is also this: the new technologies--and the speed with which changes are occurring in this field--have driven the East European countries back together again. Cooperation is absolutely necessary. The hindrance of the COCOM lists is real, just as is the risk of a growing technological gap between East and West.

Besides, to achieve technological independence of the West is one of the most exciting adventures there is.

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